CHEMICAL QUALITY

OF

WATER RESOURCES

OF THE

CONEWANGO CREEK BASIN

BY
W. A. BEETEM

PREPARED COOPERATIVELY BY THE GEOLOGICAL SURVEY
UNITED STATES DEPARTMENT OF INTERIOR AND THE
NEW YORK STATE DEPARTMENT OF COMMERCE

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Thomas E. Dewey, Governor
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CONTENTS

	Page
Abstract	IV
Introduction	1
Acknowledgments	3
Description of the area	4
Factors influencing chemical quality of water resources	
Rainfall	6
Geology	11
Pollution	12
Chemical quality of water resources in Conewango Creek basin	
Surface water	14
Ground water	17
Temperature	19
Chemical quality and industrial utility	20
Map index of surface water sampling sites	25
Appendix	
Definition of terms	58
Factors	58

TABLES

Table 1	Rainfall at Jamestown, N. Y.	10
2	Runoff in inches, Conewango Creek basin	10
3	Discharge in cubic feet per second for period of sampling compared with ten-year average Conewango Creek basin	11
4	Comparison of chemical quality of surface and ground water, Cassadaga, N. Y.	13
5	Summary of yield from wells in Conewango Creek basin	18
6	Water-quality tolerances for industrial applications	21

TABLES (Continued)

		Page
Table 7	Range in chemical quality of miscellaneous surface waters in Conewango Creek basin	22
8	Range in chemical quality of ground waters in Conewango Creek basin	23
9	Chemical analyses for miscellaneous surface water sites	31
10	Chemical analyses for daily station Conewango Creek at Russell, Pa.	42
11	Conewango Creek at Russell, Pa., temperature of water, water year October 1951 to September 1952	44
12	Records of wells sampled in Conewango Creek basin .	46
13	Miscellaneous ground water analyses	51

ILLUSTRATIONS

Figure 1	Index map of New York State showing the principal drainage basins	V
2	Dissolved solids and mean discharge, Conewango Creek at Russell, Pa.	8
3	Variations of dissolved solids at selected sites in the Conewango Creek basin	9
4	Graphical analyses of water in the Conewango Creek basin	15
5	Total hardness and non-carbonate hardness variations, Conewango Creek at Russell, Pa. . .	16
6	Map of Conewango Creek drainage basin showing surface water sampling sites	24
7	Map of Conewango Creek drainage basin showing ground water sampling sites	45
8	Sketch map illustrating well location system	50

A B S T R A C T

This report incorporates the data obtained in a study of the chemical quality of the water resources in the Conewango Creek basin, New York. The study was made during the period October 1951 to September 1952.

Conewango Creek is a tributary of the Allegheny River. It has a drainage area of 816 square miles in the southwestern corner of New York State. Generally, on the basis of mineral content, the waters in the basin are of good quality. Moderate or no treatment of the waters would be required for most industrial or public supply uses. In some of the ground water samples, excessive amounts of iron are present and in a few samples, hydrogen sulfide was found.

This report offers a brief description of the area, a discussion of the factors that influence the chemical quality of water as well as a tabulation of the analyses and related data obtained in the Conewango Creek basin.

The data tabulated in this report represent only one year of study. As the chemical quality of water varies, periodic checks are being made to determine the fluctuations of chemical quality of the water resources of the Conewango Creek basin. The data obtained will appear in subsequent reports.

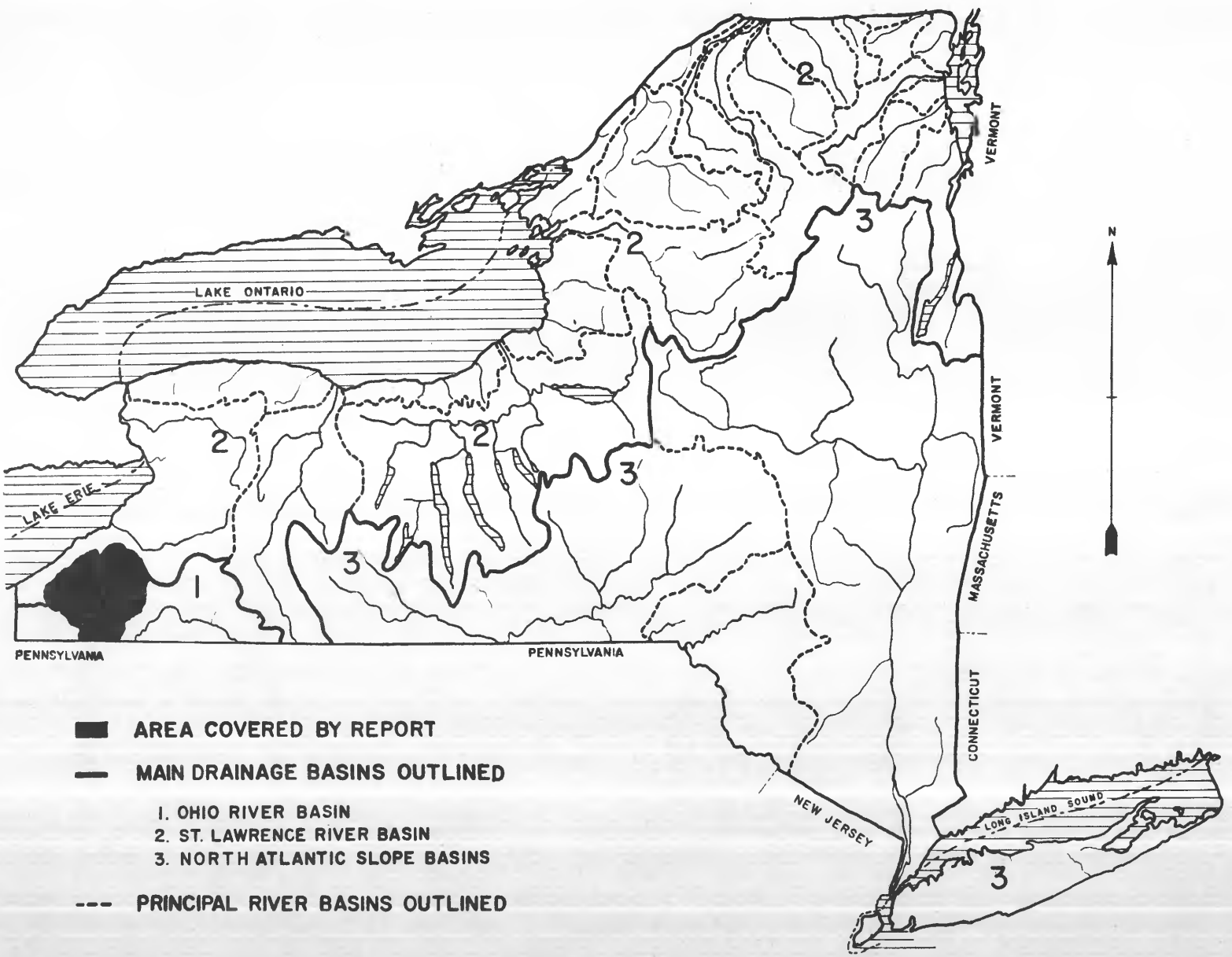


Figure 1-INDEX MAP OF NEW YORK STATE SHOWING THE PRINCIPAL DRAINAGE BASINS

CHEMICAL QUALITY OF WATER RESOURCES of the CONEWANGO CREEK BASIN

by

W. A. Beetem

INTRODUCTION

Water is one of the most valuable natural resources in New York State. A glance at Figure 1, a map of New York State, shows a network of streams and rivers that covers the entire State. Many natural lakes are scattered throughout the State. Lake Erie, Lake Ontario - two of the Great Lakes - and the St. Lawrence River bound the State on the north. Along the eastern border are Lake Champlain, Lake George and the Hudson River. Underground are reservoirs of ground water. These form a tremendous source of water supply. The utility of water resources does not depend on quantity alone, because a knowledge of the chemical quality of water is needed to complete the picture. Is the water hard or soft? Does it contain objectionable amounts of mineral matter? Is it corrosive? Does the chemical quality vary throughout the year? The answers to these and many other questions are needed for the evaluation of water by the agriculturist, the industrialist, municipal, State and Federal governments.

To obtain the necessary data on the chemical quality of water resources in New York State, the State Department of Commerce, in cooperation with the United States Geological Survey, started a continuing program in

1952. This report incorporates the results of the first year of study in the Conewango Creek basin.

The first part of the investigation consisted of selecting sites and collecting water samples from Conewango Creek, Chadakoin River, Cassadaga Creek and their tributaries during periods of high and low flows. Related data, such as water temperature and water discharges, were also obtained at the time of sample collection.

In addition to the selected sampling in the basin, use was made of data from a chemical quality daily station being operated on the Conewango Creek at Russell, Pa., by the United States Geological Survey, in cooperation with the Pennsylvania State Department of Commerce. The data from this station permitted a better evaluation of the basin area as a whole and a close check on day to day variations in chemical quality.

In the Conewango Creek basin, surface water is only a portion of the total available water. Ground water is also available in most areas of the basin and samples were collected at selected locations. Data to indicate the source and availability of ground water were collected to supplement data already available.

Surface and ground water samples were analyzed to determine the concentrations of mineral substances in solution at time of collection.

During the water year 1953-1954, water samples will be collected and discharge measurements made at 4 selected sites in the portion of the Conewango Creek basin in New York State: Conewango Creek at Waterboro, Chadakoin River at Falconer, Cassadaga Creek at Ross Mills and Conewango Creek at Frewsburg.

ACKNOWLEDGMENTS

Acknowledgments are extended to Harold Keller, Commissioner of Commerce, and Ronald B. Peterson, Director of the Bureau of Business Promotion, New York State Department of Commerce. Records of discharge were furnished by A. W. Harrington, District Engineer, and J. W. Mangan, District Engineer, of the Surface Water Branch offices, U. S. Geological Survey in Albany, New York, and Harrisburg, Pennsylvania, respectively. Geologic data were furnished by E. S. Asselstine, Geologist in Charge, Ground Water Branch, U. S. Geological Survey, Albany, New York. Acknowledgment is also made to F. H. Pauszek, Acting District Chemist, 1/ New York-New England, Quality of Water Branch, U. S. Geological Survey, for help in preparing the report.

Chemical quality data on the Conewango Creek at Russell, Pennsylvania, were furnished by N. H. Beamer, District Chemist, Quality of Water Branch, U. S. Geological Survey, Philadelphia, Pennsylvania. Other chemical analyses were made by personnel of the Quality of Water Branch Laboratory, U. S. Geological Survey, Washington, D. C.

Appreciation is also expressed to the many owners of private property, well drillers and public officials in the Conewango Creek basin for their cooperation and for the data to indicate the occurrence and availability of ground water furnished the Ground Water Branch, Albany, N. Y., for inclusion in this report.

The work was under the general supervision of S. K. Love, Chief, Quality of Water Branch, the immediate supervision of W. F. White, Acting District Chemist, 2/ and W. A. Beetem, Chemist in Charge, Quality of Water Branch, U. S. Geological Survey, Saratoga Springs, New York.

1/ Effective January 5, 1953
2/ Transferred January 5, 1953

DESCRIPTION OF THE AREA

The Conewango Creek basin is in the southwestern corner of New York State and the adjacent portion of the State of Pennsylvania. About 95 percent of the area, shaded black on Figure 1, lies in Cattaraugus and Chautauqua counties of New York and about 5 percent in Pennsylvania. Physiographically, the basin is in the Allegheny Plateau. This plateau consists of a series of wide valleys surrounded by rolling hills. In the northern portions of the basin, several swamp and marsh areas occur.

Conewango Creek has a small stream gradient. To illustrate, from Kendall Corners, Cattaraugus County, to Frewsburg, Chautauqua County, the incline is less than 3 feet per mile and in several areas it is less than a foot per mile. This physiographic feature with many low banks contributes to back water and bank overflow during high flows in parts of the basin.

Conewango Creek has its origin in northern Cattaraugus County, several miles south of the village of Cattaraugus. The origin and the network of tributaries of Conewango Creek can be followed on Figure 6. Conewango Creek increases in size rapidly below South Dayton where it is joined by Slab City Creek and West Branch Conewango Creek, and then flows in a southerly direction. In this section, most of the flow from the drainage area is diverted into the State drainage ditch. At Waterboro, Conewango Creek changes to a meandering south-southwesterly direction. Throughout this part of the basin, Conewango Creek is fed by a number of small tributaries, the largest of which is Little Conewango Creek. Downstream near the New York-Pennsylvania border, Conewango Creek is fed by the Chadakoin River and several other smaller tributaries. Of these smaller tributaries, Stillwater Creek is the most noteworthy.

Conewango Creek then changes its course again to a southerly direction, crosses the New York-Pennsylvania border and joins Allegheny River at Warren, Pa., 11 miles below the New York-Pennsylvania state line.

In following the course of Conewango Creek, more than a passing glance should be given to Chadakoin River and its tributary, Cassadaga Creek. Chadakoin River is the outlet of Chautauqua Lake, one of the largest natural lakes in New York State, having a drainage area of about 180 square miles. Just south of Levant, Chautauqua County, Cassadaga Creek joins the Chadakoin River. Cassadaga Creek originates in the northern region of Chautauqua County where it drains the Cassadaga lakes. Several miles north of South Stockton, Cassadaga Creek is joined by Bear Lake outlet and continues southeasterly to its junction with Chadakoin River about 4.5 miles east of Jamestown, N. Y.

FACTORS INFLUENCING CHEMICAL QUALITY OF WATER RESOURCES

Water is one of our natural resources that can be replenished.

RAINFALL

The hydrologic cycle operates continually. Water evaporates, rises into the atmosphere, is condensed and again reaches the earth in the form of rain, sleet or snow. On reaching the earth, rain flows over the land surface or percolates through the ground following the path of least resistance. Eventually, the runoff of both surface and ground water forms the streams, rivers and lakes. A large portion of the water remains in the ground and forms reservoirs of ground water.

Except for dissolved gases, atmospheric water is comparatively pure. As water moves over or through rocks and soils, it dissolves soluble minerals that occur in these materials. Thus, comparatively chemically pure rainwater that reaches the earth soon may contain silica, iron, manganese, calcium, magnesium, chloride, sulfate, to mention only a few of the possible mineral constituents that may be present in the water.

During the periods of heavy rainfall, runoff is generally rapid and the time of contact with the earth's mineral matter is short. Consequently, the water will be lower in mineral matter than during dry periods when most of the runoff may be ground water which has been in contact with the soluble rocks and soils much longer.

The effect of runoff and retention time on the concentration of dissolved solids of the Conewango Creek at Russell, Pa., is shown on Figure 2. An increased runoff is reflected in the decrease of dissolved solids concentration, while in periods of low runoff, as retention time increased, the dissolved solids content increased. The bar graph on Figure 3 which follows shows the ranges of variations in dissolved solids found in streams in the basin. For illustrative purposes, six streams of approximately the same size drainage area were chosen. The dissolved solids contents are shown for either of two days in May when the runoff was much higher than the date shown in August.

During the period of October 1951 to September 1952, the total amount of rainfall in Jamestown, as reported by the Weather Bureau of the United States Department of Commerce, was 36.00 inches. This figure was about 18 percent below the normal yearly average of 43.79 inches. Table 1 shows the amounts of precipitation each month of the aforementioned period and the normal amount of precipitation at Jamestown. Table 2 gives the runoff in inches at the three surface water gaging stations within the basin and Table 3 gives the average discharge in cubic feet per second at the same locations.

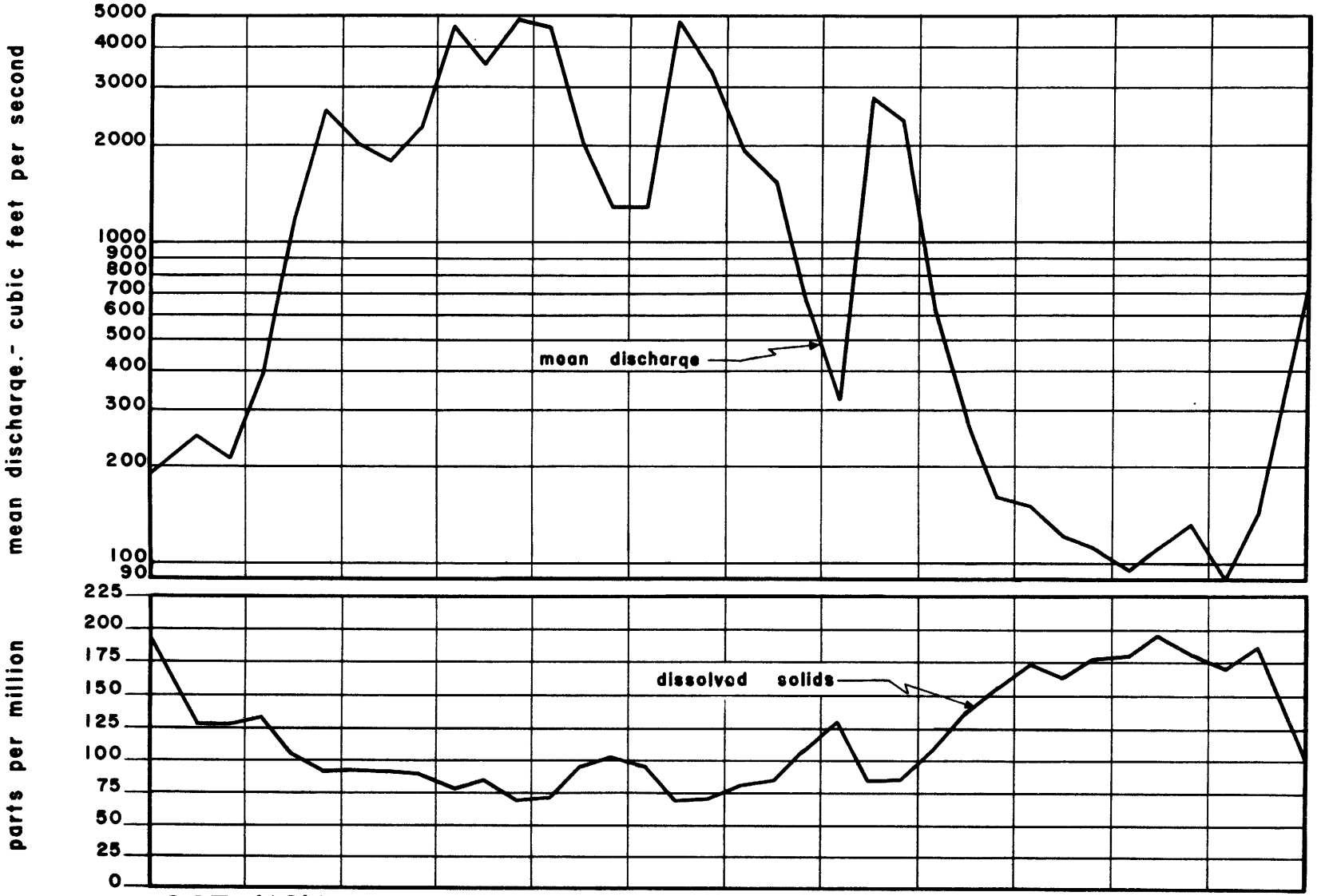


Figure 2 DISSOLVED SOLIDS AND MEAN DISCHARGE, CONEWANGO CREEK AT RUSSELL, PA.

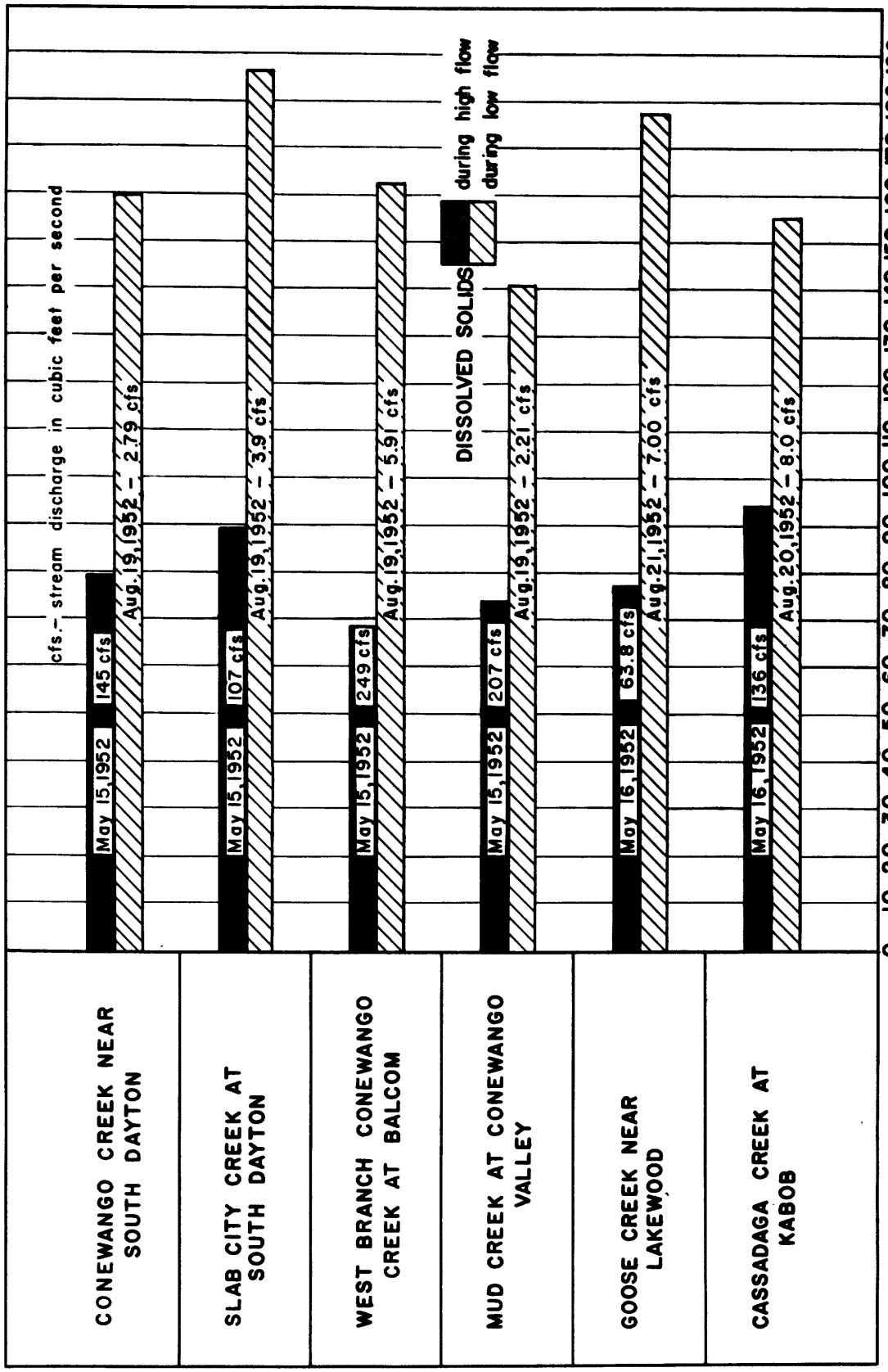

CONEWANGO CREEK NEAR SOUTH DAYTON
SLAB CITY CREEK AT SOUTH DAYTON
WEST BRANCH CONEWANGO CREEK AT BALCOM
MUD CREEK AT CONEWANGO VALLEY
GOOSE CREEK NEAR LAKEWOOD
CASSADAGA CREEK AT KABOB
cfs.- stream discharge in cubic feet per second
May 15,1952 145 cfs
Aug.19,1952 - 2.79 cfs
May 15,1952 107 cfs
Aug.19,1952 - 3.9 cfs
May 15,1952 249 cfs
Aug.19,1952 - 5.91 cfs
May 15,1952 207 cfs
Aug.19,1952 - 2.21 cfs
May 16,1952 63.8 cfs
Aug.21,1952 - 7.00 cfs
May 16,1952 136 cfs
Aug.20,1952 - 8.0 cfs
DISSOLVED SOLIDS
during high flow
during low flow
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190
parts per million

Figure 3. VARIATIONS OF DISSOLVED SOLIDS AT SELECTED SITES IN THE CONEWANGO CREEK BASIN.

Table 1 - RAINFALL AT JAMESTOWN, N. Y.

Month	Precipitation in inches Oct. 1951 to Sept. 1952 1/	Normal Precipitation in inches 1/ 2/
October	1.69	3.49
November	4.91	3.78
December	4.65	3.94
January	3.80	3.45
February	2.82	2.98
March	2.30	3.51
April	1.88	3.42
May	3.62	3.52
June	1.38	4.19
July	3.08	4.37
August	3.37	3.43
September	2.50	3.71
Total	36.00	43.79

1/ Based on climatological data published by U. S. Department of Commerce, Weather Bureau, Volumes LXIV and LXV.
2/ Monthly average and total based on continuous record from 1922 to 1948 and broken record between 1850 and 1921.

Table 2 - RUNOFF IN INCHES,
CONEWANGO CREEK BASIN

Location	October 1951 to September 1952	Ten Year Average October 1942 to September 1952
Conewango Creek at Waterboro, N Y.	24.26	25.17
Chadakoin River at Falconer, N. Y.	23.02	25.52
Conewango Creek at Russell, Pa.	24.66	25.78

Table 3 - DISCHARGE IN CUBIC FEET PER SECOND FOR PERIOD OF SAMPLING COMPARED WITH TEN YEAR AVERAGE, CONEWANGO CREEK BASIN

Location	October 1951 to September 1952	Ten Year Average October 1942 to September 1952
Conewango Creek at Waterboro, N. Y.	517	537
Chadakoin River at Falconer, N. Y. 1/	328	364
Conewango Creek at Russell, Pa. 1/	1,477	1,548

1/ Adjusted for change in contents at Chautauqua Lake.

GEOLOGY

The geology of any area influences the chemical quality of water. The amount and kind of soluble material in the rock and soil, the length of contact time of water with rock and soil, the temperature and pressure at that contact time largely determine the amount and kind of mineral matter dissolved.

In the Conewango Creek basin the underlying rock is almost completely composed of a group of shales known as the Chemung Formation. The shaley beds, with some interbedded sandstones and siltstones, of the Chemung formation contain numerous joints and bedding planes. These permit circulation, storage and replenishment of ground water. The coarse unconsolidated material overlying the bedrock consists of sand and gravel derived from commuted bedrock.

During periods of little rainfall and low flow, the chemical quality of surface water is very similar to the ground water in the area since most of the stream flow is being supplied from subsurface sources. Table 4 gives

chemical analyses, in equivalents per million, of surface and ground water samples collected at Cassadaga, N. Y. Below these analyses, cumulative percentage of the equivalents per million are shown to illustrate that the two analyses are nearly identical in chemical composition. This marked similarity shows the interdependence of the surface and ground water.

POLLUTION

The chemical quality of water is affected by pollution, both human and industrial. In this report, no attempt is made to evaluate the sanitary and industrial pollution except as they pertain to chemical quality of the water. A survey of the sanitary aspects of water quality of the Conewango Creek basin has been made by the Water Pollution Control Board of the New York State Department of Health in their Report No. 1 of the Allegheny River Drainage Basin series. This report cited some small pollution of streams in the basin by sanitary wastes, treated and untreated, from some towns and single domestic units. There is also a small amount of industrial pollution throughout the basin. The greatest pollution by industrial wastes as reported in Report No. 1 was in the Jamestown area affecting the Chadakoin River, principally below Warner Dam which is used to stabilize Chautauqua Lake. On the basis of Report No. 1 and the sampling done for this report, with the exception of the Chadakoin River, the water shows little effect of chemical waste pollution. As a result, most of the waters would be suitable for industrial processes requiring water free from contaminating materials.

Table 4. -- COMPARISON OF CHEMICAL QUALITY OF SURFACE AND GROUND WATER, CASSADAGA, N.Y.

	Calcium (Ca)	Magnesium (Mg)	Sodium + Potassium (Na+K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Nitrate (NO_3)	Total
	Equivalents Per Million							
CASSADAGA CREEK at Cassadaga, Chautauqua Co., N.Y. August 20, 1952	1.447	0.312	0.096 1/	1.508	0.250	0.087	0.010	3.710
CASSADAGA PUBLIC SUPPLY WELLS, 2/ Cassadaga, Chautauqua Co., N.Y. August 20, 1952	1.896	.535	.122 3/	2.147	.375	.099	.013	5.187

Constituent	Cumulative Percent of Equivalents Per Million	
	Cassadaga Creek	Cassadaga Wells
Calcium (Ca)	39.0	36.6
Magnesium (Mg)	47.4	46.9
Sodium + Potassium (Na+K)	50.0	49.3
Bicarbonate (HCO_3)	90.7	90.7
Sulfate (SO_4)	97.4	97.9
Chloride (Cl)	99.7	99.8
Nitrate (NO_3)	100.0	100.0

1/ Based on calculated value of sodium plus potassium
2/ Analysis of raw water composite sample from two wells used for public supply.
3/ Based on determined values of sodium and potassium.

CHEMICAL QUALITY OF WATER RESOURCES IN CONEWANGO CREEK BASIN

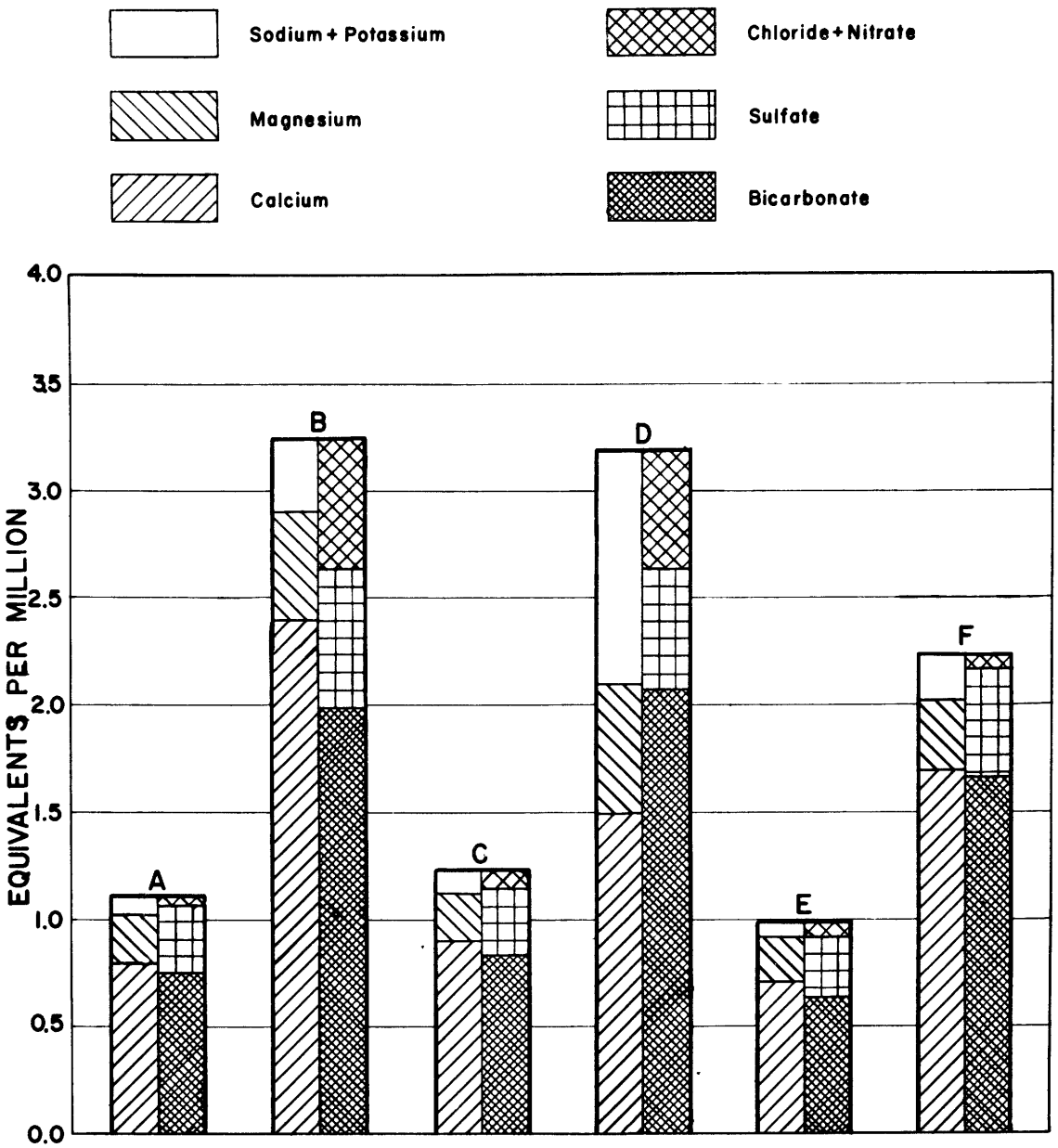
SURFACE WATER

The surface water sites examined from October 1951 to September 1952 were of such chemical quality that the water could be used for nearly all domestic, public supply and industrial uses. For some uses, moderate treatment would be required.

In the northern portions of Chautauqua and Cattaraugus counties where Cassadaga and Conewango creeks originate, the color of the water from swamp and marsh areas might prove objectionable. Treatment for removal of part of of the hardness during low-water stages might be necessary for certain industrial processes. For most of these purposes, the cost of treatment would not be excessive.

Table 9 beginning on page 31 is a tabulation of the miscellaneous analyses obtained during this study. Table 10 contains analyses of Conewango Creek at Russell, Pa., obtained during the period of study by the U. S. Geological Survey in cooperation with the Pennsylvania Department of Commerce.

Included also is a map on page 24 showing the surface water sampling sites. Graphical illustrations of the variations of chemical make-up of the waters and the variations of the hardness of Conewango Creek at Russell, Pa. are given on the following figures.



A Conewango Creek at Waterboro, N.Y. 1,370 cfs, May 16, 1952.
B Conewango Creek at Waterboro, N.Y., 58 cfs, August 19, 1952.
C Chadakoin River at Falconer, N.Y., 762 cfs, May 17, 1952.
D Chadakoin River at Falconer, N.Y., 17 cfs, August 20, 1952.
E Cassadaga Creek at Ross Mills, N.Y., 935 cfs, May 16, 1952.
F Cassadaga Creek at Ross Mills, N.Y., 30 cfs, August 20, 1952.

Figure 4. Graphical analyses of water in the Conewango Creek Basin.

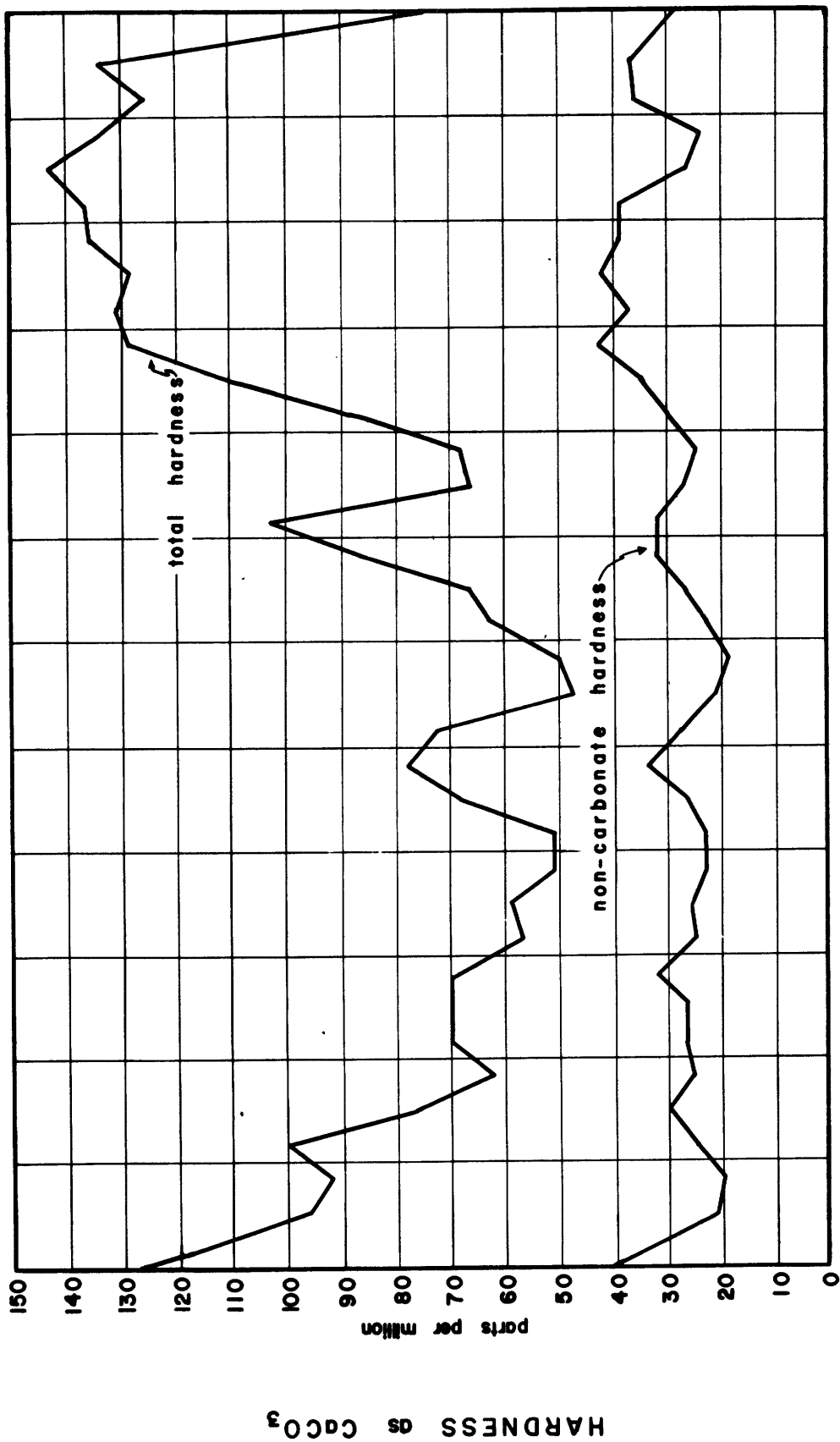


Figure 5. TOTAL HARDNESS AND NON-CARBONATE HARDNESS VARIATIONS, CONEWANGO CREEK AT RUSSELL, PA.

GROUND WATER

Analyses of ground water samples showed generally satisfactory quality. Dissolved solids for the most part were less than 200 parts per million. In places the water is quite hard and there are local problems relating to excessive amounts of iron. Treatment of the water to remove iron and manganese or hardness would be necessary for certain industrial and public supply uses.

On the whole, in the ground waters examined, greater concentrations of mineral matter were found in ground water than in surface water. A comparison of the medians of concentrations of mineral matter of surface and ground waters examined shows dissolved solids 97 and 160 parts per million; total hardness as $CaCO_3$, 74 and 108 parts per million, and bicarbonate (HCO_3) 86 and 154 parts per million, respectively.

However, certain physical characteristics of ground water make its use more desirable for many purposes. Ground water is normally free of suspended matter, low in color and turbidity. Temperatures of ground water at levels below 30 feet normally vary less than $1^{\circ}F$ throughout the year, whereas temperatures of surface supplies may fluctuate $50^{\circ}F$ or more from summer to winter.

On the map shown in Figure 7, the locations of the wells are given from which samples of water were collected. Tables 5 and 12 give information pertaining to the wells. Chemical data are presented in Table 13.

Table 5. - SUMMARY OF YIELD
FROM WELLS IN CONEWANGO CREEK BASIN

Water-Bearing Formation	Yield (gallons per minute)			Number of wells
	Avg.	Max.	Min.	
Pleistocene clay and mixed deposits	12	17	8	2
Pleistocene sand and gravel	230	1,500	2	156
Chemung formation	62	550	1.5	28

TEMPERATURE

The requirements for a public water supply are fulfilled by a water of good quality and sufficient quantity; whereas in industry, the temperature of water is an additional requirement that must be considered, especially where water is needed for cooling. A water of poorer quality but more suitable temperature in some instances is more desirable than one of superior quality and undesirable temperature.

Indirectly, temperature of water will effect physical and chemical changes in water. For example, the solubility of a gas in water depends on the temperature, gas pressure and the nature of the gas itself. A rise in temperature causes a decrease in the solubility of a gas and will hasten the volatilization of any gas in the water. The effect of a change in temperature can be readily observed. In polluted streams, a rise in temperature at times causes a lowering of the amount of dissolved oxygen and thus reduces the amount of self-purification which a stream will undergo. From an industrial viewpoint, the presence of dissolved oxygen and carbon dioxide in water will make water corrosive; a reduction in concentration of the gases will tend to reduce the corrosiveness.

Because of the importance of temperature data, the examination of water for chemical quality also includes the measurement of temperature at the time of sampling or by continuous records from water temperature recorders. Table 11 contains once-daily temperature readings made of Conewango River at Russell, Pa. Additional temperature data are shown in the tables of miscellaneous chemical analyses.

CHEMICAL QUALITY AND INDUSTRIAL UTILITY

Water quality tolerances vary with its use by industry. For example, in the manufacture of textiles and fine paper, a water that is soft, colorless and low in mineral matter, especially iron and manganese, is required. Laundries, too, need soft water low in iron and manganese concentrations. For efficient boiler operation, the mineral content of water should be low in calcium, magnesium, sulfate and silica to avoid hard scale and deposition. The beverage and canning industries require a water that does not affect the taste and quality of the product. Table 6 gives some of the quality-of-water tolerances that have been established for certain industries, and includes certain constituents that were analyzed in this study.

Ranges of chemical constituents in surface and ground water with the medians of the samples examined during the study are given in Tables 7 and 8. The data for the daily station, Conewango Creek at Russell, Pa., are not included with the miscellaneous data in Table 7 since inclusion of a year's record would give undue emphasis to a single location. However, the arithmetic averages given in Table 10 compare fairly well with the medians for the data at this station.

Table 6 - WATER QUALITY TOLERANCES FOR INDUSTRIAL APPLICATIONS 1/

Industry	Turbidity ppm.	Color ppm.	Color + O_2 Consumed ppm.	D.O. ml./l	Odor	Hardness ppm.	Alkalinity ppm.	pH	Total Solids ppm.	Ca ppm.	Fe ppm.	Mn ppm.	Fe + Mn ppm.	Al_2O_3 ppm.	SiO_2 ppm.	Cu ppm.	F ppm.	CO_3 ppm.	HCO_3 ppm.	OH ppm.	$CaSO_4$ ppm.	Na_2SO_4 to Na_2SO_5 ratio	General 2/
Air Conditioning 3/	—	—	—	—	—	—	—	—	—	—	0.5	0.5	0.5	—	—	—	—	—	—	—	—	—	A,B
Baking	10	10	—	—	—	—4/	—	—	—	—	0.2	0.2	0.2	—	—	—	—	—	—	—	—	—	C
Boiler Feed:																							
0–150 psi.	20	80	100	2	—	75	—	8.0+	1000–3000	—	—	—	—	5	40	—	—	200	50	50	—	1 to 1	—
150–250 psi.	10	40	50	0.2	—	40	—	8.5+	500–2500	—	—	—	—	0.5	20	—	—	100	30	40	—	2 to 1	—
250 psi. and up	5	5	10	0	—	8	—	9.0+	100–1500	—	—	—	—	0.05	5	—	—	40	5	30	—	3 to 1	—
Brewing 5/																							
Light	10	—	—	—	Low	—	75	6.5–7.0	500	100–200	0.1	0.1	0.1	—	—	—	1	—	—	—	100–200	—	C,D
Dark	10	—	—	—	Low	—	150	7.0	1000	200–500	0.1	0.1	0.1	—	—	—	1	—	—	—	200–500	—	C,D
Canning																							
Legumes	10	—	—	—	Low	25–75	—	—	—	—	0.2	0.2	0.2	—	—	—	—	—	—	—	—	—	C
General	10	—	—	—	Low	—	—	—	—	—	0.2	0.2	0.2	—	—	—	1	—	—	—	—	—	C
Carbonated Beverages 6/	2	10	10	—	0	250	50	—	850	—	0.2	0.2	0.3	—	—	—	0.2	—	—	—	—	—	C
Confectionary	—	—	—	—	Low	—	—	—7/	100	—	0.2	0.2	0.2	—	—	—	—	—	—	—	—	—	—
Cooling 8/	50	—	—	—	—	50	—	—	—	—	0.5	0.5	0.5	—	—	—	—	—	—	—	—	—	A,B
Food, General	10	—	—	—	Low	—	—	—	—	—	0.2	0.2	0.2	—	—	—	—	—	—	—	—	—	C
Ice (Raw Water) 9/	1–5	5	—	—	—	—	30–50	—	300	—	0.2	0.2	0.2	—	10	—	—	—	—	—	—	—	C
Laundering	—	—	—	—	—	50	—	—	—	—	0.2	0.2	0.2	—	—	—	—	—	—	—	—	—	—
Plastics, Clear, Uncolored	2	2	—	—	—	—	—	—	200	—	0.02	0.02	0.02	—	—	—	—	—	—	—	—	—	—
Paper and Pulp:																							
Groundwood	50	20	—	—	—	180	—	—	—	—	1.0	0.5	1.0	—	—	—	—	—	—	—	—	—	A
Kraft Pulp	25	15	—	—	—	100	—	—	300	—	0.2	0.1	0.2	—	—	—	—	—	—	—	—	—	—
Soda and Sulfite	15	10	—	—	—	100	—	—	200	—	0.1	0.05	0.1	—	—	—	—	—	—	—	—	—	—
Light Paper, HL-Grade	5	5	—	—	—	50	—	—	200	—	0.1	0.05	0.1	—	—	—	—	—	—	—	—	—	B
Rayon (Viscose) Pulp:																							
Production	5	5	—	—	—	8	50	—	100	—	0.05	0.03	0.05	8.0	25	5	—	—	—	—	—	—	—
Manufacture	0.3	—	—	—	—	55	—	7.8–8.3	—	—	0.0	0.0	0.0	—	—	—	—	—	—	—	—	—	—
Tanning 11/	20	10–100	—	—	—	50–135	135	8.0	—	—	0.2	0.2	0.2	—	—	—	—	—	—	—	—	—	—
Textiles																							
General	5	20	—	—	—	20	—	—	—	—	0.25	0.25	—	—	—	—	—	—	—	—	—	—	—
Dyeing 12/	5	5–20	—	—	—	20	—	—	—	—	0.25	0.25	0.25	—	—	—	—	—	—	—	—	—	—
Wool Scouring 13/	—	70	—	—	—	20	—	—	—	—	1.0	1.0	1.0	—	—	—	—	—	—	—	—	—	—
Cotton Bandage 13/	5	5	—	—	Low	20	—	—	—	—	0.2	0.2	0.2	—	—	—	—	—	—	—	—	—	—

1/ American Water Works Assn., Water Quality and Treatment, Table 3-4, Water quality tolerance, industrial applications, page 67, 1950.
2/ A-No corrosiveness; B-No slime formation; C-Conformance to federal drinking water standards necessary; D-NaCl, 275 ppm.
3/ Waters with algae and hydrogen sulfide odors are most unsuitable for air conditioning.
4/ Some hardness desirable.
5/ Water for distilling must meet the same general requirements as for brewing (gin and spirits mashing water of light beer quality; whiskey mashing water of dark-beer quality).
6/ Clear, odorless, sterile water for syrup and carbonization. Water consistent in character. Most high quality filtered municipal water not satisfactory for beverages.
7/ Hard candy requires pH of 7.0 or greater, as low value favors inversion of sucrose, causing sticky product.
8/ Control of corrosiveness is necessary as is also control of organisms, such as sulfur and iron bacteria, which tend to form slimes.
9/ $Ca(HCO_3)2$ particularly troublesome. $Mg(HCO_3)2$ tends to greenish color. CO_2 assists to prevent cracking. Sulfates and chlorides of Ca, Mg, Na should be less than 300 ppm. (white butts).
10/ Uniformity of composition and temperature desirable. Iron objectionable since cellulose absorbs iron from dilute solutions. Manganese very objectionable, clogs pipelines and is oxidized to permanganates by chlorine, causing reddish color.
11/ Excessive iron, manganese or turbidity creates spots and discoloration in tanning of hides and leather goods.
12/ Constant composition; residual alumina 0.5 ppm.
13/ Calcium, magnesium, iron manganese, suspended matter and soluble organic matter may be objectionable.

Table 7. - RANGE IN CHEMICAL QUALITY OF MISCELLANEOUS SURFACE WATERS IN CONEWANGO CREEK BASIN

Constituent	Concentration (parts per million)			Number of samples examined
	Median	Maximum	Minimum	
Silica (SiO_2)	4.5	52	1.3	67
Iron (Fe), dissolved 1/	0.06	0.09	0.00	12
Manganese (Mn), dissolved 1/	0.00	0.06	0.00	35
Bicarbonate (HCO_3)	86	233	24	124
Sulfate (SO_4)	17	69	10	115
Chloride (Cl)	2.0	20	0.2	117
Dissolved solids	97	210	52	63
Total hardness as $CaCO_3$	74	222	30	124
Non-carbonate hardness as $CaCO_3$	13	62	0	124
Color	9	90	0	115

1/ In solution at time of analysis.

Table 8. - RANGE IN CHEMICAL QUALITY OF GROUND WATERS IN CONEWANGO CREEK BASIN

Constituent	Concentration (parts per million)			Number of samples examined
	Median	Maximum	Minimum	
Silica (SiO_2)	10	39	5.6	39
Iron (Fe) 1/	0.20	2.8	0.03	39
Manganese (Mn) 1/	0.05	0.52	0.00	20
Iron + Manganese (Fe+Mn) 1/	0.30	3.1	0.11	20
Bicarbonate (HCO_3)	154	260	72	39
Sulfate (SO_4)	19	116	1.5	39
Chloride (Cl)	5.0	110	0.5	39
Dissolved solids	180	435	103	39
Total hardness as $CaCO_3$	108	279	36	39
Non-carbonate hardness as $CaCO_3$	4	116	0	39
Color	5	12	0	39

1/ Total

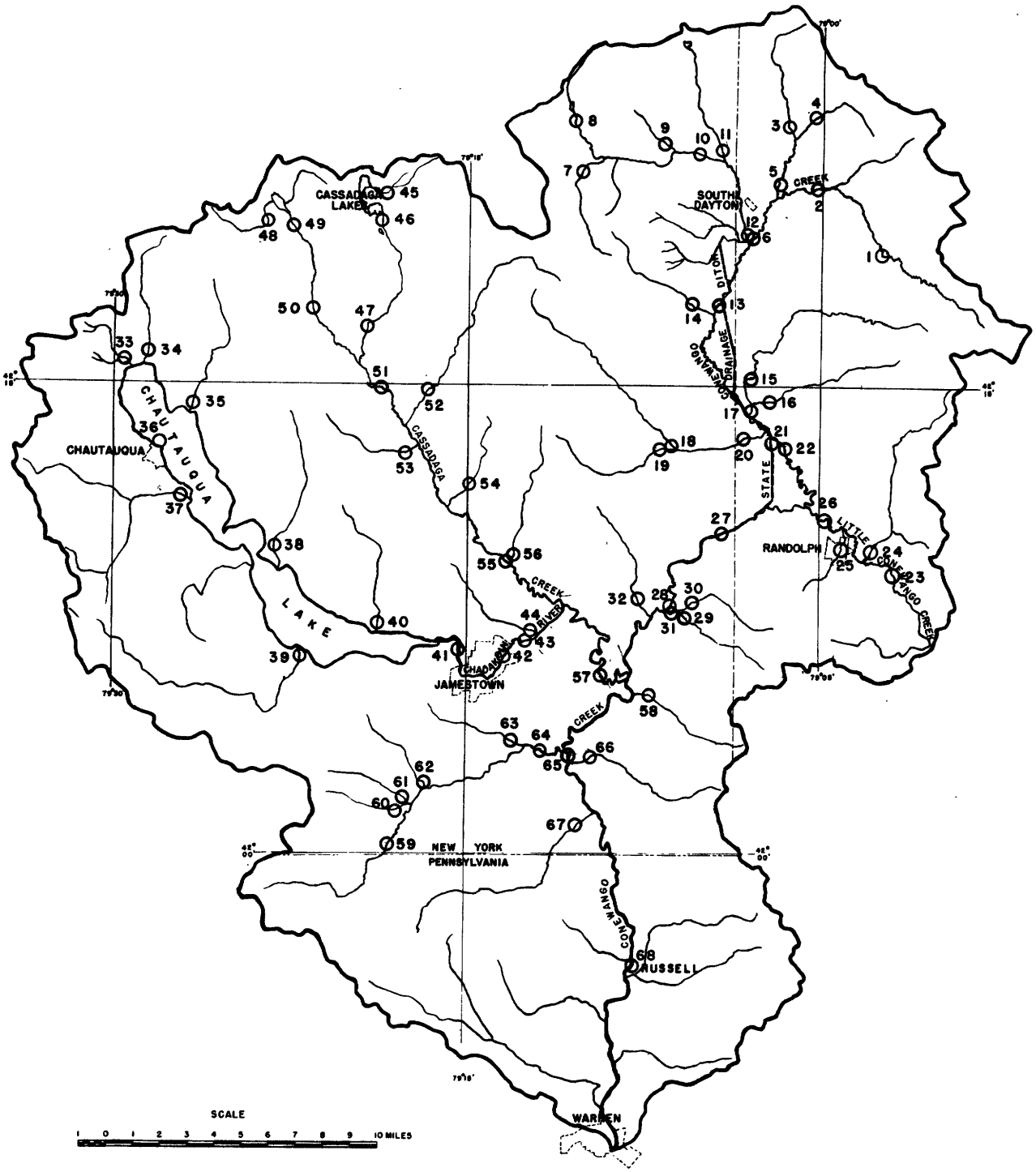


FIGURE 6. MAP OF CONEWANGO CREEK DRAINAGE BASIN SHOWING SURFACE WATER SAMPLING SITES.

MAP INDEX OF SURFACE WATER SAMPLING SITES

Site Number	Stream and Location
1	CONEWANGO CREEK AT KENDALL CORNERS, bridge on Kendall Corners - East Leon Road, 0.05 mile north of Kendall Corners, Cattaraugus County.
2	CONEWANGO CREEK NEAR SOUTH DAYTON, bridge on Route 241, 3.0 miles south of Markham, Cattaraugus County.
3	SLAB CITY CREEK NEAR MARKHAM, bridge on county road parallel to Erie Railroad, 1.3 miles southwest of Markham, Cattaraugus County.
4	JOHNSON CREEK AT MARKHAM, bridge on Route 241, 0.3 mile south of Markham, Cattaraugus County.
5	SLAB CITY CREEK AT SOUTH DAYTON, bridge on Route 322, 0.8 mile east of South Dayton, Cattaraugus County.
6	CONEWANGO CREEK NEAR SOUTH DAYTON, bridge on dirt road, 2.4 miles south of South Dayton, 0.1 mile north of confluence with West Branch, Cattaraugus County.
7	WEST BRANCH CONEWANGO CREEK NEAR HAMLET, bridge on Hamlet Road, 1.9 miles west of Hamlet, 0.1 mile from junction with Hamlet-Cassadaga Road, Chautauqua County.
8	WEST MUD LAKE OUTLET NEAR BLACK CORNERS, bridge on Route 83, 2.7 miles northwest of Hamlet, Chautauqua County.
9	TRIBUTARY 4 TO WEST BRANCH CONEWANGO CREEK NEAR HAMLET, bridge on Butcher Road, 1.4 miles northeast of Hamlet, Chautauqua County.
10	WEST BRANCH CONEWANGO CREEK AT BALCOM, bridge on county road, 0.4 mile north of Balcom, Chautauqua County.
11	NORTH BRANCH CONEWANGO CREEK NEAR BALCOM, bridge on Smith Road, 1.1 miles northwest of Balcom, Chautauqua County.

MAP INDEX OF SURFACE WATER SAMPLING SITES (Continued)

Site Number	Stream and Location
12	WEST BRANCH CONEWANGO CREEK NEAR SOUTH DAYTON, bridge on dirt road, 2.4 miles south of South Dayton, 0.1 mile north of confluence with Slab City Creek, Cattaraugus County.
13	CONEWANGO CREEK NEAR CHERRY CREEK, bridge on county road, 1.5 miles east of Cherry Creek, Chautauqua County.
14	CHERRY CREEK AT CHERRY CREEK, bridge on county road in Cherry Creek, Chautauqua County.
15	MUD CREEK NEAR CONEWANGO VALLEY, bridge on county road, 2.0 miles northeast of Conewango Valley, Cattaraugus County.
16	MILL CREEK AT CONEWANGO VALLEY, bridge on county road, 1.0 mile east of Conewango Valley, Cattaraugus County.
17	MUD CREEK AT CONEWANGO VALLEY, bridge on Route 62, 0.4 mile east of Conewango Valley, Cattaraugus County.
18	CLEAR CREEK AT ELLINGTON, bridge on Route 62, 0.3 mile east of Ellington, Chautauqua County.
19	TWENTY EIGHT CREEK AT ELLINGTON, bridge on Route 62, 0.05 mile south of Ellington, Chautauqua County.
20	CLEAR CREEK AT CLEAR CREEK, bridge on town road, 0.3 mile west of Clear Creek, Chautauqua County.
21	CONEWANGO CREEK NEAR CLEAR CREEK (STATE DRAINAGE DITCH), bridge on town road, 1.3 miles east of Clear Creek, Cattaraugus County.
22	CONEWANGO CREEK NEAR CLEAR CREEK, bridge on town road, 2.0 miles east of Clear Creek, Cattaraugus County.
23	LITTLE CONEWANGO CREEK NEAR RANDOLPH, bridge on town road, 1.5 miles south of East Randolph, Cattaraugus County.

MAP INDEX OF SURFACE WATER SAMPLING SITES (Continued)

Site Number	Stream and Location
24	ELM CREEK AT RANDOLPH, bridge on county road, 0.9 mile east of Randolph, Cattaraugus County.
25	BATTLE CREEK AT RANDOLPH, bridge on Route 17 in Randolph, Cattaraugus County.
26	LITTLE CONEWANGO CREEK AT RANDOLPH, bridge on county road, 0.6 mile north of Randolph, Cattaraugus County.
27	CONEWANGO CREEK AT WATERBORO, bridge on Route 17, 0.2 mile southeast of Waterboro, Chautauqua County.
28	CONEWANGO CREEK NEAR CLARK, bridge on town road, 0.6 mile northeast of Clark, Chautauqua County.
29	MUD CREEK AT CLARK, bridge on Route 62, 0.15 mile northeast of Clark, Chautauqua County.
30	ELKINS CREEK AT CLARK, bridge on Route 62, 0.9 mile northeast of Clark, Chautauqua County.
31	MUD CREEK AT CLARK, bridge on town road, 0.4 mile northwest of Clark, Chautauqua County.
32	DRY BROOK AT POLAND CENTER, bridge on Route 17, 0.2 mile west of Poland Center, Chautauqua County.
33	LITTLE INLET AT MAYVILLE, bridge on Route 17J, 0.9 mile north of Mayville, Chautauqua County.
34	BIG INLET AT HARTFIELD, bridge on Route 424 at Hartfield, Chautauqua County.
35	DEWITTVILLE CREEK AT DEWITTVILLE, bridge on Route 17 at Dewittville, Chautauqua County.
36	CHAUTAUQUA LAKE AT CHAUTAUQUA, raw water intake at Chautauqua Filtration Plant, Chautauqua County.
37	PRENDERGAST CREEK NEAR CHAUTAUQUA, bridge on Route 17J, 1.6 miles southeast of Chautauqua, Chautauqua County.
38	BEMUS CREEK AT BEMUS POINT, bridge on Route 17, 0.3 mile upstream from Bemus Creek - Chautauqua Lake confluence, Chautauqua County.

MAP INDEX OF SURFACE WATER SAMPLING SITES (Continued)

Site Number	Stream and Location
39	GOOSE CREEK NEAR LAKEWOOD, bridge on Route 17J, 2.3 miles west of Lakewood, Chautauqua County,
40	DUTCH HOLLOW CREEK AT GREENHURST, bridge on Route 17, 0.3 mile west of Route 17 and Route 380 junction, Chautauqua County.
41	CHADAKOIN RIVER AT FLUVANNA, pier on left bank, 1 block west of Jamestown city line, Chautauqua County.
42	CHADAKOIN RIVER AT JAMESTOWN, bridge on Buffalo Street in Jamestown, Chautauqua County.
43	CHADAKOIN RIVER AT FALCONER, bridge on South Dow Street in Falconer, Chautauqua County.
44	MOON CREEK AT FALCONER, bridge in Falconer, 1 block upstream from Route 17 bridge, Chautauqua County.
45	TRIBUTARY 1 TO MUD POND OF CASSADAGA LAKES NEAR CASSADAGA, bridge on Route 60, 0.6 mile north of Cassadaga, Chautauqua County.
46	CASSADAGA CREEK AT CASSADAGA, bridge on Route 424 in Cassadaga, Chautauqua County.
47	CASSADAGA CREEK AT KABOB, bridge on dirt road, 2.8 miles north of South Stockton, Chautauqua County.
48	HOWARD CREEK NEAR KELLEY CORNERS, bridge on Route 380, 1.3 miles west of Kelley Corners, Chautauqua County.
49	BEAR LAKE OUTLET AT KELLEY CORNERS, bridge on Route 380, 0.3 mile west of Kelley Corners, Chautauqua County.
50	BEAR LAKE OUTLET NEAR STOCKTON, bridge on Route 380, 2.5 miles south of Stockton, Chautauqua County.
51	CASSADAGA CREEK AT SOUTH STOCKTON, bridge on dirt road, 0.4 mile north of South Stockton, Chautauqua County.

MAP INDEX OF SURFACE WATER SAMPLING SITES (Continued)

Site Number	Stream and Location
52	MILL CREEK NEAR SINCLAIRVILLE, five hundred feet east of Junction of South Stockton - Sinclairville Road and Red Bird - Sinclairville Road, 0.5 mile northeast of Red Bird, Chautauqua County.
53	TOWERVILLE CREEK AT TOWERVILLE CORNERS, bridge on Route 380, 0.15 mile north of Towerville Corners, Chautauqua County.
54	HATCH CREEK AT GERRY, bridge on Route 60 at Gerry, Chautauqua County.
55	CASSADAGA CREEK AT ROSS MILLS, bridge on town road, 2.8 miles northwest of Falconer, 50 ft. north of Route 60, Chautauqua County.
56	FOLSOM CREEK NEAR ROSS MILLS, bridge on county road, 2.4 miles southeast of Gerry, Chautauqua County.
57	CHADAKOIN RIVER NEAR FALCONER, bridge on county road, 2.0 miles east of Falconer, Chautauqua County.
58	CASS RUN NEAR FREWSBURG, bridge on Route 62, 3.3 miles northeast of Frewsburg, Chautauqua County.
59	STILLWATER CREEK NEAR BUSTI, bridge on dirt road, 2.5 miles southwest of Busti, Chautauqua County.
60	LINDQUIST CREEK NEAR BUSTI, bridge on county road, 1.1 miles southwest of Busti, Chautauqua County.
61	BAKER CREEK NEAR BUSTI, bridge on county road, 0.8 mile southwest of Busti, Chautauqua County.
62	HATCH CREEK AT BUSTI, bridge on county road, 0.3 mile east of Busti, Chautauqua County.
63	TRIBUTARY 1 OF STILLWATER CREEK AT STILLWATER, bridge on county road, 20 ft. from Route 60 in Stillwater, Chautauqua County.
64	STILLWATER CREEK NEAR STILLWATER, bridge on county road, 2.0 miles west of Frewsburg, Chautauqua County.

MAP INDEX OF SURFACE WATER SAMPLING SITES (Continued)

Site Number	Stream and Location
65	CONEWANGO CREEK NEAR FREWSBURG, bridge on Route 60 at Frewsburg, Chautauqua County.
66	FREW RUN AT FREWSBURG, bridge on Route 62 at Frewsburg, Chautauqua County.
67	KIANTONE CREEK AT KIANTONE, bridge on Frissell Road, 0.8 mile east of Kiantone, Chautauqua County.
68	CONEWANGO CREEK AT RUSSELL, PA., bridge in Russell, Warren County, 0.4 mile upstream from Ackley Run, 8.0 miles upstream from mouth.

Table 9. - CONEWANGO CREEK BASIN

MISCELLANEOUS ANALYSES OF STREAMS IN CONEWANGO CREEK BASIN IN NEW YORK

Chemical analyses, in parts per million, water year October 1951 to September 1952

38947

Date of collection	Discharge (cfs)	Water temperature (°F)	Silica (SiO_2)	Iron (Fe) a/	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
																Total	Noncarbonate			
CONEWANGO CREEK AT KENDALL CORNERS																				
May 15, 1952	0.77	54	3.8	—	—	13	2.3	b/7.7		36	25	1.8	—	0.8	64	42	12	95.6	7.0	13
Aug. 19 ——	1.77	74	5.4	—	—	31	2.6	b/5.3		97	13	4.0	—	1.1	122	88	8	195	7.5	12
CONEWANGO CREEK NEAR SOUTH DAYTON c/																				
May 15, 1952	e/145	52	4.0	0.09	0.00	17	2.7	2.3	0.9	50	17	.9	0.2	.6	79	54	13	119	7.0	18
Aug. 19 ——	2.79	70	5.2	—	.00	40	5.9	3.4	1.6	129	25	3.2	.1	1.3	160	124	18	251	7.5	4
SLAB CITY CREEK NEAR MARKHAM																				
May 15, 1952	e/57	51	—	—	—	—	—	—	—	56	21	.8	—	—	—	64	18	132	7.1	40
Aug. 19 ——	2.00	68	—	—	—	—	—	—	—	118	37	2.2	—	—	—	130	33	260	7.5	10
JOHNSON CREEK AT MARKHAM																				
May 15, 1952	e/28	54	—	—	—	—	—	—	—	44	22	1.0	—	—	—	53	17	101	7.4	90
Aug. 19 ——	1.0	73	—	—	—	—	—	—	—	110	—	1.2	—	1.0	—	92	2	185	7.2	22
SLAB CITY CREEK AT SOUTH DAYTON																				
May 15, 1952	107	52	2.7	—	.00	18	2.6	1.3	.6	49	15	.8	.1	1.0	89	56	15	120	6.8	35
Aug. 19 ——	e/3.9	71	8.5	—	—	41	4.1	b/3.0		104	34	2.7	—	1.3	187	119	34	248	7.4	30
CONEWANGO CREEK NEAR SOUTH DAYTON d/																				
May 15, 1952	286	54	3.8	—	—	20	3.2	b/2.4		57	20	—	—	.8	108	63	16	133	7.2	—
Aug. 19 ——	7.58	70	8.0	—	.00	53	6.4	3.0	2.0	148	41	3.0	.1	1.0	199	159	37	318	7.3	7

a/ In solution at time of analysis
b/ Na plus K
c/ 2.5 miles east of South Dayton. Just upstream from confluence with Slab City Creek.
d/ 3 miles south of South Dayton. 0.1 mile from confluence with West Branch of Conewango Creek.
e/ Estimated

Table 9. - CONEWANGO CREEK BASIN (Continued)

MISCELLANEOUS ANALYSES OF STREAMS IN CONEWANGO CREEK BASIN IN NEW YORK (Continued)

Chemical analyses, in parts per million, water year October 1951 to September 1952 (Continued)

38947

Date of collection	Discharge (cfs)	Water temperature (°F)	Silica (SiO_2)	Iron (Fe) a/	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Hardness as $CaCO_3$ Total	Hardness as $CaCO_3$ Noncarbonate	Specific conductance (micromhos at 25°C)	pH	Color
WEST BRANCH CONEWANGO CREEK NEAR HAMLET																				
May 15, 1952	84.5	49	3.6	0.06	0.00	10	1.7	b/1.2		25	12	0.6	—	1.1	52	32	12	73.3	6.9	8
Aug. 19 ----	1.15	65	—	—	—	—	—	—	—	101	20	2.0	—	—	—	95	12	197	7.8	20
WEST MUD LAKE OUTLET NEAR BLACK CORNERS																				
May 15, 1952	e/20	52	—	—	—	—	—	—	—	62	19	1.8	—	—	—	64	13	132	7.2	28
Aug. 19 ----	e/.6	59	—	.00	—	33	5.0	b/2.0		112	10	2.8	—	1.5	—	103	11	205	6.9	15
TRIBUTARY 4 TO WEST BRANCH CONEWANGO CREEK NEAR HAMLET c/																				
May 15, 1952	e/52	50	—	—	—	—	—	—	—	32	17	1.2	—	—	—	42	16	91.3	6.9	15
Aug. 19 ----	1.2	66	—	—	—	—	—	—	—	93	26	2.0	—	—	—	90	14	185	7.4	10
WEST BRANCH CONEWANGO CREEK AT BALCOM																				
May 15, 1952	249	51	3.6	.05	.00	15	2.4	1.4	0.4	40	14	.7	0.2	1.0	69	47	14	101	7.1	15
Aug. 19 ----	5.91	68	6.8	—	--	40	5.4	b/5.2		134	18	2.8	—	1.0	163	122	12	247	7.8	20
NORTH BRANCH CONEWANGO CREEK NEAR BALCOM																				
May 15, 1952	51.4	52	4.2	.07	.00	17	2.8	b/2.2		50	16	.6	—	.7	77	54	13	117	7.0	20
Aug. 19 ----	1.93	67	—	—	—	—	—	—	—	119	35	2.5	—	—	—	126	28	257	7.7	10
WEST BRANCH CONEWANGO CREEK NEAR SOUTH DAYTON																				
May 15, 1952	e/375	52	3.4	—	—	18	2.9	b/13		49	16	20	—	1.1	96	57	17	120	7.2	—
Aug. 19 ----	e/9.8	74	6.0	—	.05	49	8.0	8.7	2.0	156	33	11	.1	1.3	205	155	27	334	7.4	10

a/ In solution at time of analysis
b/ Na plus K
c/ Enters left bank 0.8 mile northeast of Ba lcom and 0.5 mile southwest of Villenova
e/ Estimated

Table 9. - CONEWANGO CREEK BASIN (Continued)

MISCELLANEOUS ANALYSES OF STREAMS IN CONEWANGO CREEK BASIN IN NEW YORK (Continued)

Chemical analyses, in parts per million, water year October 1951 to September 1952 (Continued)

38947

Date of collection	Discharge (cfs)	Water temperature (°F)	Silica (SiO_2)	Iron (Fe) a/	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
																Total	Noncarbonate			
CONEWANGO CREEK NEAR CHERRY CREEK																				
May 15, 1952	—	54	—	—	—	—	—	—	—	50	18	0.8	—	—	—	58	17	122	7.2	26
Aug. 19 ——	—	71	—	—	—	—	—	—	—	153	38	4.2	—	—	—	160	35	315	7.6	7
CHERRY CREEK AT CHERRY CREEK																				
May 15, 1952	75.8	52	5.9	—	0.00	11	1.0	1.0	0.6	26	10	1.0	0.2	0.6	52	32	10	73.7	7.2	2
Aug. 19 ——	—	70	6.2	—	.00	34	4.0	2.6	1.2	108	16	2.4	.0	1.1	126	101	13	210	7.5	8
Aug. 21 ——	19.9	63	—	—	.00	—	—	—	—	88	19	2.0	—	1.6	—	88	16	184	7.5	7
MUD CREEK NEAR CONEWANGO VALLEY b/																				
May 15, 1952	e/123	51	—	—	—	—	—	—	—	40	15	1.0	—	—	—	45	12	104	7.0	14
Aug. 19 ——	e/1.3	57	—	—	—	—	—	—	—	105	20	2.9	—	—	—	98	12	206	8.0	40
MILL CREEK AT CONEWANGO VALLEY																				
May 15, 1952	e/83.5	51	—	—	—	—	—	—	—	84	16	.8	—	—	—	79	10	157	7.3	27
Aug. 19 ——	e/.9	81	—	—	—	—	—	—	—	120	15	1.2	—	—	—	108	10	209	7.9	5
MUD CREEK AT CONEWANGO VALLEY c/																				
May 15, 1952	e/207	51	6.8	0.06	.00	15	3.1	d/2.4		45	16	1.0	—	.7	74	50	13	110	7.2	12
Aug. 19 ——	2.21	64	7.6	—	—	37	3.3	d/7.5		121	18	2.4	—	1.2	141	106	7	223	8.1	10
CLEAR CREEK AT ELLINGTON																				
May 15, 1952	e/159	49	—	—	—	—	—	—	—	33	12	.2	—	—	—	38	11	84.1	7.2	5
Aug. 19 ——	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

a/ In solution at time of analysis
b/ Just upstream from confluence with Mill Creek, 1.5 miles north of Conewango Valley
c/ Just downstream from confluence with Mill Creek, 0.25 mile east of Conewango Valley
d/ Na plus K
e/ Estimated

Table 9. - CONEWANGO CREEK BASIN (Continued)

MISCELLANEOUS ANALYSES OF STREAMS IN CONEWANGO CREEK BASIN IN NEW YORK (Continued)

Chemical analyses, in parts per million, water year October 1951 to September 1952 (Continued)

38947

Date of collection	Discharge (cfs)	Water temperature (°F)	Silica (SiO_2)	Iron (Fe) a/	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
																Total	Noncarbonate			
TWENTY EIGHT CREEK AT ELLINGTON																				
May 15, 1952	e/54	49	4.5	—	—	11	1.3	b/0.9		26	12	5.0	—	0.5	57	33	12	72.8	7.2	—
Aug. 19 ——	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
CLEAR CREEK AT CLEAR CREEK																				
May 15, 1952	236	48	3.6	—	0.00	13	2.2	1.3	1.1	38	12	1.2	0.1	.7	60	42	10	92.5	7.3	0
Aug. 19 ——	e/0.00	68	—	—	—	—	—	—	—	98	17	1.8	—	—	—	89	9	184	7.4	5
CONEWANGO CREEK NEAR CLEAR CREEK (STATE DRAINAGE DITCH)																				
May 15, 1952	—	53	—	—	—	—	—	—	—	44	14	.4	—	—	—	50	14	113	6.9	30
Aug. 19 ——	—	70	—	—	—	—	—	—	—	144	31	2.8	—	—	—	148	30	289	7.5	6
CONEWANGO CREEK NEAR CLEAR CREEK																				
May 15, 1952	—	51	—	—	—	—	—	—	—	55	19	1.0	—	—	—	64	19	130	6.8	27
Aug. 19 ——	—	73	—	—	—	—	—	—	—	128	17	2.3	—	—	—	113	8	230	7.9	3
LITTLE CONEWANGO CREEK NEAR RANDOLPH																				
May 15, 1952	54.8	55	4.2	0.07	.00	12	2.2	b/2.2		35	13	.9	—	.5	59	39	10	87.4	7.2	8
Aug. 19 ——	e/10.1	74	—	—	—	—	—	—	—	134	—	1.5	—	—	—	118	8	243	8.1	10
ELM CREEK AT RANDOLPH																				
May 15, 1952	110	53	3.3	—	—	16	2.2	b/1.5		44	14	.8	—	.7	70	49	13	101	7.2	3
Aug. 19 ——	10.1	70	6.1	—	.00	25	5.8	2.8	1.4	94	12	2.0	—	.8	114	86	9	184	7.6	5

a/ In solution at time of analysis
b/ Na plus K
c/ Sub-surface flow between pools
e/ Estimated

Table 9. - CONEWANGO CREEK BASIN (Continued)

MISCELLANEOUS ANALYSES OF STREAMS IN CONEWANGO CREEK BASIN IN NEW YORK (Continued)

Chemical analyses, in parts per million, water year October 1951 to September 1952 (Continued)

38947

Date of collection	Discharge (cfs)	Water temperature (°F)	Silica (SiO_2)	Iron (Fe) a/	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Hardness as $CaCO_3$ Total	Hardness as $CaCO_3$ Noncarbonate	Specific conductance (micromhos at 25°C)	pH	Color
BATTLE CREEK AT RANDOLPH																				
May 16, 1952	47.0	50	4.2	—	—	16	2.7	b/1.9		46	16	0.2	—	0.6	78	51	13	104	7.2	7
Aug. 19 ——	.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
LITTLE CONEWANGO CREEK AT RANDOLPH																				
May 16, 1952	e/233	52	4.2	—	—	17	2.8	b/2.0		51	15	.4	—	.6	97	54	12	117	7.2	8
Aug. 19 ——	34.1	69	5.9	—	0.00	33	4.5	3.5	1.2	112	16	2.1	0.0	.8	124	101	9	208	7.4	8
CONEWANGO CREEK AT WATERBORO																				
May 16, 1952	c/1,370	52	3.3	0.08	.00	16	2.8	1.4	.4	46	16	.6	.2	.8	77	51	14	112	7.1	20
May 17 ——	c/ 854	—	—	—	—	—	—	—	—	58	—	—	—	—	—	64	16	130	7.1	—
Aug. 19 ——	c/ 58	71	4.1	—	—	48	6.1	b/8.1		148	31	6.2	—	.4	—	145	24	299	7.4	5
CONEWANGO CREEK NEAR CLARK																				
May 17, 1952	e/953	55	—	—	—	—	—	—	—	56	15	1.0	—	—	—	62	16	127	7.0	18
Aug. 20 ——	e/55	71	—	—	—	—	—	—	—	144	26	4.5	—	—	—	136	18	278	7.8	10
MUD CREEK AT CLARK d/																				
May 17, 1952	e/18	52	—	—	—	—	—	—	—	96	16	2.0	—	—	—	90	11	183	7.8	2
Aug. 20 ——	e/ 1.3	75	—	—	—	—	—	—	—	122	13	2.3	—	—	—	108	8	214	7.6	5
ELKINS CREEK AT CLARK																				
May 17, 1952	e/12	52	—	—	—	—	—	—	—	55	13	1.2	—	—	—	56	11	116	7.4	7
Aug. 20 ——	e/.8	63	—	—	—	—	—	—	—	130	17	2.5	—	—	—	113	6	226	7.7	13

a/ In solution at time of analysis
b/ Na plus K
c/ Mean daily discharge
d/ Mud Creek just upstream from confluence with Elkins Creek. 0.1 mile east of Clark
e/ Estimated

Table 9. - CONEWANGO CREEK BASIN (Continued)

MISCELLANEOUS ANALYSES OF STREAMS IN CONEWANGO CREEK BASIN IN NEW YORK (Continued)

Chemical analyses, in parts per million, water year October 1951 to September 1952 (Continued)

38947

Date of collection	Discharge (cfs)	Water temperature (°F)	Silica (SiO_2)	Iron (Fe) a/	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
																Total	Noncarbonate			
MUD CREEK AT CLARK c/																				
May 17, 1952	e/35	51	5.7	0.09	—	22	3.2	b/2.6		70	14	1.0	—	0.8	90	68	11	146	7.5	3
Aug. 20 ——	2.41	71	4.7	—	—	40	4.4	b/5.8		126	17	6.2	—	1.2	150	118	15	234	7.5	5
DRY BROOK AT POLAND CENTER																				
May 17, 1952	e/21	53	—	—	—	—	—	—	—	46	14	.2	—	—	—	52	14	115	7.5	4
Aug. 20 ——	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
LITTLE INLET AT MAYVILLE																				
May 16, 1952	e/9.2	53	—	—	—	—	—	—	—	38	20	1.0	—	—	—	46	15	101	7.0	23
BIG INLET AT HARTFIELD																				
May 16, 1952	30.0	55	3.5	—	0.00	15	3.1	1.3	0.6	41	18	.8	0.0	.8	76	50	17	108	7.0	10
Aug. 21 ——	.34	65	5.0	—	.00	29	6.4	2.8	2.2	101	18	2.5	.2	.8	124	99	16	206	7.5	10
DEWITTVILLE CREEK AT DEWITTVILLE																				
May 16, 1952	e/34	52	—	—	—	—	—	—	—	63	13	.8	—	—	—	62	10	130	7.5	4
Aug. 21 ——	e/.4	65	—	—	—	—	—	—	—	123	29	1.8	—	—	—	118	17	232	7.6	5
CHAUTAUQUA LAKE AT CHAUTAUQUA (RAW WATER INTAKE AT FILTRATION PLANT) d/																				
Aug. 21,1952	—	—	2.4	—	.00	—	—	—	—	56	15	3.0	—	.8	—	60	14	94.5	7.3	6
PRENDERGAST CREEK NEAR CHAUTAUQUA																				
May 16, 1952	65.0	52	3.8	—	—	18	2.7	b/3.5		58	14	.9	—	.4	76	56	8	115	7.4	1
Aug. 21 ——	7.86	65	5.4	—	—	42	1.8	b/5.4		128	16	1.2	—	.5	138	112	7	227	7.6	10

a/ In solution at time of analysis
b/ Na plus K
c/ Mud Creek just downstream from confluence with Elkins Creek. 0.5 mile northwest of Clark.
d/ Analysis of treated water collected on the same date is also available.
e/ Estimated

Table 9. - CONEWANGO CREEK BASIN (Continued)

MISCELLANEOUS ANALYSES OF STREAMS IN CONEWANGO CREEK BASIN IN NEW YORK (Continued)

Chemical analyses, in parts per million, water year October 1951 to September 1952 (Continued)

38947

Date of collection	Discharge (cfs)	Water temperature (°F)	Silica (SiO_2)	Iron (Fe) a/	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
																Total	Noncarbonate			
BEMUS CREEK AT BEMUS POINT																				
May 16, 1952	26.5	53	3.5	—	—	16	2.2	b/2.0		46	14	0.6	—	0.3	72	49	11	103	7.2	2
Aug. 21 ——	.34	—	19	0.01	0.00	30	5.4	2.6	1.3	96	18	3.8	0.1	1.0	132	97	18	196	7.4	5
GOOSE CREEK NEAR LAKEWOOD																				
May 16, 1952	63.8	56	4.0	—	—	19	2.8	b/2.8		58	15	1.2	—	.4	77	59	11	120	7.3	2
Aug. 21 ——	7.00	70	4.2	—	—	40	4.4	b/6.3		134	18	1.9	—	.5	178	118	8	242	7.5	10
DUTCH HOLLOW CREEK AT GREENHURST																				
May 16, 1952	e/14	52	—	—	—	—	—	—	—	50	15	1.0	—	—	—	52	11	111	7.5	10
Aug. 21 ——	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
CHADAKOIN RIVER AT FLUVANNA																				
May 17, 1952	e/743	53	1.3	—	—	18	3.2	b/4.6		56	16	3.8	—	.2	82	58	12	129	6.8	15
Aug. 20,——	e/17	71	5.0	—	—	24	2.9	b/8.7		86	13	4.6	—	.5	114	72	2	177	7.0	20
CHADAKOIN RIVER AT JAMESTOWN (BUFFALO STREED BRIDGE)																				
May 17, 1952	e/ 759	55	—	—	—	—	—	—	—	41	—	—	—	—	—	56	22	122	7.0	—
Aug. 20 ——	e/17	80	—	—	—	—	—	—	—	119	—	—	—	—	—	100	2	263	7.3	30
CHADAKOIN RIVER AT FALCONER																				
May 17, 1952	c/ 762	55	3.3	.00	.02	18	2.8	2.1	.9	51	15	2.4	.0	.7	76	56	14	126	7.4	1
Aug. 20 ——	c/ 17	77	4.7	—	.06	30	7.3	22	5.4	127	27	19	.3	.4	200	105	1	303	7.4	35

a/ In solution at time of analysis
b/ Na plus K
c/ Mean daily discharge
e/ Estimated

Table 9. - CONEWANGO CREEK BASIN (Continued)

MISCELLANEOUS ANALYSES OF STREAMS IN CONEWANGO CREEK BASIN IN NEW YORK (Continued)

Chemical analyses, in parts per million, water year October 1951 to September 1952 (Continued)

38947

Date of collection	Discharge (cfs)	Water temperature (°F)	Silica (SiO_2)	Iron (Fe) a/	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Hardness as $CaCO_3$ Total	Hardness as $CaCO_3$ Non-carbonate	Specific conductance (micromhos at 25°C)	pH	Color
MOON CREEK AT FALCONER																				
May 17, 1952	4.84	53	5.1	—	—	33	4.8	b/4.9		99	24	4.0	—	1.0	130	102	21	206	7.8	1
Aug. 19 ——	.39	69	6.6	0.01	—	53	2.9	b/7.1		152	27	4.5	—	.5	—	144	19	293	7.7	10
TRIBUTARY 1 TO MUD POND OF CASSADAGA LAKES NEAR CASSADAGA																				
May 16, 1952	e/11	51	—	—	—	—	—	—	—	72	18	2.2	—	—	—	76	17	153	6.7	18
Aug. 20 ——	.29	58	—	—	—	—	—	—	—	149	15	2.3	—	—	—	118	0	289	7.7	6
CASSADAGA CREEK AT CASSADAGA																				
May 16, 1952	e/34	54	—	—	—	—	—	—	—	92	17	4.0	—	—	—	93	18	187	7.6	3
Aug. 20 ——	2.92	72	5.2	—	—	29	3.8	b/2.2		92	12	3.1	—	.6	107	88	13	184	7.7	7
CASSADAGA CREEK AT KABOB																				
May 16, 1952	e/136	50	3.8	—	0.00	21	4.0	1.9	0.9	65	16	2.1	0.1	.7	95	69	16	145	7.0	7
Aug. 20 ——	e/8.0	67	9.9	—	.00	32	9.5	2.9	1.1	119	23	3.5	.1	.7	157	119	21	234	7.6	7
HOWARD CREEK NEAR KELLEY CORNERS																				
May 16, 1952	24.8	52	4.2	—	—	14	2.2	b/1.4		36	16	.2	—	.6	73	44	14	91.2	6.7	32
Aug. 20 ——	.05	69	8.5	—	—	37	4.3	b/6.3		58	69	2.5	—	1.0	193	110	62	245	6.9	20
BEAR LAKE OUTLET AT KELLEY CORNERS																				
May 16, 1952	e/48	53	—	—	—	—	—	—	—	32	18	.8	—	—	—	39	13	89.9	6.8	30
Aug. 20 ——	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
BEAR LAKE OUTLET NEAR STOCKTON																				
May 16, 1952	e/156	51	2.6	—	.00	14	2.9	1.3	.9	38	16	.8	.1	18	74	47	16	100	6.8	15
Aug. 20 ——	e / 2.7	68	—	—	.00	—	—	—	—	120	28	3.4	—	—	—	124	26	255	7.4	7

a/ In solution at time of analysis
b/ Na plus K
e/ Estimated

Table 9. - CONEWANGO CREEK BASIN (Continued)

MISCELLANEOUS ANALYSES OF STREAMS IN CONEWANGO CREEK BASIN IN NEW YORK (Continued)

Chemical analyses, in parts per million, water year October 1951 to September 1952 (Continued)

38947

Date of collection	Discharge (cfs)	Water temperature (°F)	Silica (SiO_2)	Iron (Fe) a/	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Hardness as $CaCO_3$ Total	Hardness as $CaCO_3$ Noncarbonate	Specific conductance (micromhos at 25°C)	pH	Color
CASSADAGA CREEK AT SOUTH STOCKTON																				
May 16, 1952	e/374	52	—	—n	—	—	—	—	—	43	17	1.0	—	—	—	52	17	105	6.9	25
Aug. 20 ——	e/29	69	—	—	—	—	—	—	—	108	21	3.2	—	—	—	112	24	228	7.9	7
MILL CREEK NEAR SINCLAIRVILLE																				
May 16, 1952	74.4	49	4.2	—	0.00	16	2.2	1.2	0.6	46	12	1.4	0.1	0.7	67	49	11	106	7.3	5
Aug. 20 ——	.42	65	8.3	—	—	33	2.8	a/4.1		104	12	3.2	—	.8	131	94	9	198	7.8	5
TOWERVILLE CREEK AT TOWERVILLE CORNERS																				
May 16, 1952	e/11	50	—	—	—	—	—	—	—	25	—	—	—	—	—	30	10	68.3	7.2	—
Aug. 20 ——	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
HATCH CREEK AT BERRY																				
May 16, 1952	e/17	49	—	—	—	—	—	—	—	24	13	1.0	—	—	—	32	12	72.4	7.1	6
Aug. 20 ——	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
CASSADAGA CREEK AT ROSS MILLS																				
May 16, 1952	935	53	3.1	—	.00	14	2.5	1.3	.9	39	14	1.1	.0	.7	68	45	13	99.7	6.8	5
Aug. 20 ——	e/30	71	6.2	—	.00	34	4.0	2.9	1.7	102	24	218	.1	.6	130	101	17	214	7.3	8
FOLSOM CREEK NEAR ROSS MILLS																				
May 16, 1952	e/16	49	—	—	—	—	—	—	—	36	—	—	—	—	—	40	10	83.5	7.4	—
Aug. 20 ——	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
CHADAKOIN RIVER NEAR FALCONER																				
May 17, 1953	e/1,780	55	2.5	—	—	17	3.3	a/2.3		48	16	3.0	—	.8	80	56	17	120	6.9	13
Aug. 20 ——	e/51	73	5.0	—	—	35	6.5	e/14		140	26	2.1	—	.2	200	114	0	317	7.3	30

a/ Na plus K

Table 9. - CONEWANGO CREEK BASIN (Continued)

MISCELLANEOUS ANALYSES OF STREAMS IN CONEWANGO CREEK BASIN IN NEW YORK (Continued)

Chemical analyses, in parts per million, water year October 1951 to September 1952 (Continued)

38947

Date of collection	Discharge (cfs)	Water temperature (°F)	Silica (SiO_2)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Hardness as $CaCO_3$ Total	Hardness as $CaCO_3$ Noncarbonate	Specific conductance (micromhos at 25°C)	pH	Color
CASS RUN NEAR FREWSBURG																				
May 17, 1952	e/12	51	—	—	—	—	—	—	—	54	12	018	—	—	—	56	12	120	9.2	5
STILLWATER CREEK NEAR BUSTI																				
May 17, 1952	e/27	51	3.3	—	—	16	3.9	a/2.5		50	16	2.4	—	0.5	80	56	15	120	7.4	12
Aug. 20 ——	.85	71	5.9	—	—	39	6.5	a/5.9		121	25	7.4	—	1.4	184	124	25	274	7.4	10
LINDQUIST CREEK NEAR BUSTI																				
May 17, 1952	e/ 6.9	53	—	—	—	—	—	—	—	56	12	2.0	—	—	—	60	14	126	7.5	5
Aug. 20 ——	0.00	78	—	—	—	—	—	—	—	112	33	3.7	—	—	—	130	38	240	7.7	10
BAKER CREEK NEAR BUSTI																				
May 17, 1952	e/5.3	53	—	—	—	—	—	—	—	58	16	1.0	—	—	—	56	8	121	7.6	3
Aug.20 ——b/	0.00	81	52	—	—	—	—	—	—	c/ 143	—	4.8	—	—	—	119	2	322	8.4	10
Aug.20 ——d/	0.00	77	—	—	—	53	6.7	a/15		190	28	5.5	—	.3	210	160	4	314	7.7	10
HATCH CREEK AT BUSTI																				
May 17, 1952	e/5.2	54	—	—	—	—	—	—	—	80	17	1.0	—	—	—	74	8	156	7.8	3
Aug. 20 ——	.05	69	—	—	—	—	—	—	—	233	41	16	—	—	—	222	31	470	7.9	10
TRIBUTARY 1 OR STILLWATER CREEK AT STILLWATER f/																				
May 17, 1952	e/7.1	55	—	—	—	—	—	—	—	83	—	—	—	—	—	85	17	183	7.6	—
Aug. 20 ——	.44	76	5.7	—	—	40	6.4	a/7.5		130	25	5.9	—	1.8	172	126	19	255	7.9	7

a/ Na plus K
b/ Two hundred feet upstream from original sampling point. Water flowing in pool, no surface flow out of pool.
c/ Includes equivalent of 3 parts per million of carbonate (CO_3)
d/ Two hundred feet downstream from original sampling point. No surface flow into pool. However, surface flow out of pool.
e/ Estimated
f/ Enters from left bank of Stillwater Creek 9.5 mile east of Stillwater.

Table 9. - CONEWANGO CREEK BASIN (Continued)

MISCELLANEOUS ANALYSES OF STREAMS IN CONEWANGO CREEK BASIN IN NEW YORK (Continued)

Chemical analyses, in parts per million, water year October 1951 to September 1952 (Continued)

38947

Date of collection	Discharge (cfs)	Water temperature (°F)	Silica (SiO_2)	Iron (Fe) a/	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
																Total	Noncarbonate			
STILLWATER CREEK NEAR STILLWATER																				
May 17, 1952	69.7	53	3.1	—	—	19	4.1	2.7	0.7	60	18	1.8	0.1	0.3	84	64	15	133	7.5	4
Aug. 20 ——	1.40	76	4.5	—	0.02	32	8.7	4.0	1.9	118	21	6.0	.0	.5	149	116	19	239	7.9	8
CONEWANGO CREEK NEAR FREWSBURG																				
May 17, 1952	e/2,750	55	4.0	0.09	.00	17	2.5	2.2	1.0	50	16	1.8	.2	1.0	b/71	53	12	124	7.1	—
Aug. 20 ——	e/109	72	5.2	—	.00	36	9.1	9.2	3.2	126	29	9.5	.1	2.8	174	127	24	291	7.3	7
FREW RUN AT FREWSBURG																				
May 17, 1952	e/10	53	—	—	—	—	—	—	—	94	14	1.0	—	—	—	92	15	185	7.9	4
Aug. 20 ——	1.35	72	—	—	—	—	—	—	—	133	19	2.5	—	—	—	120	11	248	8.0	7
KIANTONE CREEK AT KIANTONE																				
May 17, 1952	25.2	54	3.1	—	.00	15	3.5	1.8	1.0	49	16	1.2	.1	.6	69	52	12	118	7.5	0
Aug. 20 ——	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

a/ In solution at time of analysis.
b/ Sum
e/ Estimated

Table 10 - CONEWANGO CREEK BASIN

CONEWANGO CREEK AT RUSSELL, PA.

LOCATION — At highway bridge in Russell, Warren County, 0.4 mile upstream from Ackley Run and 8.0 miles upstream from mouth.

DRAINAGE AREA — 816 square miles

RECORDS AVAILABLE — Chemical analyses: October 1951 to September 1952

Water temperatures: October 1951 to September 1952

EXTREMES, Oct. 1951 to Sept. 1952 — Dissolved solids: Maximum 195 parts per million Aug. 11–20, minimum 69 parts per million Jan. 21–31, March 11–20

Total hardness: Maximum 143 parts per million Aug. 11–20, minimum, 48 parts per million March 11–20.

Water temperatures: Maximum 80°F, July 22, July 25; minimum, freezing point on many days in Dec. and Jan. and Feb. 13 and March 9.

REMARKS — Records of water discharge for water year October 1951 to September 1952 are available in district office at Harrisburg, Pa. Records of specific conductance and pH of daily samples are available in district office at Philadelphia, Pa.

Chemical analyses, in parts per million, water year October 1951 to September 1952

Date of collection	Discharge (cfs) a/	Water temperature (°F)	Silica (SiO_2)	Iron (Fe) b/	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
																Total	Non-carbonate			
Oct. 1–10, 1951	206	58	10	0.00	—	36	7.1	7.2	3.3	102	22	12	0.0	4.8	168	119	35	274	7.5	6
Oct. 11–20	245	54	8.2	.02	—	29	5.9	6.0	2.1	92	18	6.0	.0	3.3	129	97	21	217	7.7	5
Oct. 21–28, 29, 31	212	54	6.1	.00	—	28	5.5	5.6	2.3	89	19	7.5	.0	3.0	129	92	20	221	7.7	7
Nov. 1–10	391	41	4.1	.00	—	30	6.1	5.7	2.3	91	21	7.0	.0	3.9	133	100	25	230	7.4	7
Nov. 11–20	1,150	41	4.7	.00	—	23	4.8	3.4	3.1	57	27	5.0	.0	2.0	106	77	30	178	7.5	8
Nov. 21–30	2,520	35	4.7	.00	—	19	3.5	2.6	1.7	44	24	4.0	.0	1.6	92	62	26	148	7.6	7
Dec. 1–10	2,030	41	1.9	.00	—	21	4.3	2.2	1.1	53	23	4.0	.0	1.2	93	70	27	155	7.6	10
Dec. 11–20	1,790	33	5.4	.00	—	21	4.3	2.3	1.3	53	21	3.5	.0	1.5	91	70	27	157	7.7	10
Dec. 21–31	2,230	32	4.8	.00	—	21	4.3	2.6	1.2	47	21	3.5	.1	1.4	90	70	32	157	7.4	9
Jan. 1–10, 1952	4,530	33	2.3	.00	—	16	4.2	2.1	1.2	31	18	3.0	.0	1.2	78	57	25	128	6.9	10
Jan. 11–20	3,530	35	4.8	.00	—	18	3.5	2.5	1.4	40	18	3.0	.0	1.8	85	59	26	131	7.1	10
Jan. 21–31	4,880	33	3.7	.00	—	15	3.2	2.1	1.4	34	17	2.5	.0	1.3	69	51	23	116	7.1	15
Feb. 1–10	4,560	34	4.5	.00	—	15	3.4	2.0	1.3	35	16	2.5	.1	1.9	72	51	23	119	7.2	15
Feb. 11–20	2,040	33	7.4	.00	—	21	4.1	3.3	1.4	51	18	3.0	.0	1.2	94	69	27	151	7.3	10
Feb. 21–29	1,280	34	5.6	.00	—	23	5.0	3.8	1.4	54	20	4.5	.0	1.4	102	78	34	173	7.2	5
Mar. 1–10	1,290	34	3.8	.00	—	22	4.3	3.5	1.5	55	19	4.0	.0	2.0	97	73	28	164	7.3	5
Mar. 11–20	4,760	34	4.2	.00	—	14	3.1	2.1	1.4	33	15	1.5	.0	1.7	69	48	21	112	7.3	25
Mar. 21–31	3,390	40	4.2	.00	—	15	3.0	2.0	1.3	38	15	3.5	.2	1.0	70	50	19	118	6.4	5

Apr. 1–10	1,900	43	3.9	.00	—	19	3.7	2.6	1.4	48	17	3.5	.1	1.2	82	63	23	141	6.5	5
Apr. 11–20	1,530	46	4.6	.02	—	20	4.2	2.5	1.1	49	18	2.5	.1	1.8	85	67	27	146	7.6	5
Apr. 21–30	657	55	4.8	.04	—	26	5.5	3.4	1.4	68	21	4.0	.1	2.5	109	87	32	189	7.8	5
May 1–10	324	56	3.9	.05	—	31	6.2	5.8	1.5	86	22	5.0	.1	3.8	130	103	32	229	7.1	5
May 11–20	2,780	53	4.4	.05	—	20	4.2	2.4	1.2	49	17	2.5	.0	2.2	85	67	27	144	6.9	5
May 21–31	2,370	58	4.5	.02	—	20	4.3	2.4	1.0	52	16	2.5	.0	1.7	85	68	25	144	7.2	10
June 1–10	622	64	3.8	.01	—	27	5.2	3.6	1.3	72	18	4.0	.0	2.3	110	89	30	191	7.2	8
June 11–20	278	67	7.8	.02	—	33	6.8	5.3	1.8	92	20	6.0	.1	4.0	138	110	35	237	7.3	10
June 21–30	162	73	5.4	.03	—	38	8.4	6.8	2.3	105	24	7.0	.1	4.2	156	129	43	273	7.4	8
July 1–10	149	74	6.9	.03	—	40	7.6	8.0	2.7	111	27	8.0	.1	4.3	173	131	37	296	8.0	6
July 11–20	121	76	6.4	.03	—	39	7.8	5.2	2.5	107	24	10	.0	4.8	164	129	42	285	7.9	8
July 21–31	112	78	6.3	.01	—	41	8.2	9.8	3.5	118	26	11	.1	4.5	177	136	39	315	7.4	5
Aug. 1–10	95	73	7.2	.01	—	42	7.9	9.7	3.4	120	24	10	.1	5.5	180	137	39	315	7.8	8
Aug. 11–20	112	72	9.3	.05	—	42	9.4	12	4.3	142	28	12	.2	6.1	195	143	27	344	7.4	8
Aug. 21–31	132	71	8.2	.05	—	40	8.3	11	4.0	134	25	11	.1	4.3	182	134	24	318	7.4	8
Sept. 1–10	89	68	6.9	.05	—	38	7.5	10	3.2	110	25	9.5	.1	5.1	171	126	36	294	7.8	5
Sept. 11–20	142	66	7.8	.04	—	40	8.3	12	4.3	110	24	12	.2	5.8	186	134	37	328	8.3	10
Sept. 21–30	376	58	6.5	.03	—	28	6.1	6.6	1.7	78	21	8.5	.1	5.2	134	95	31	228	7.4	10
Average	—	51	5.5	.02	—	27	5.5	5.0	2.0	74	21	5.8	.1	2.9	120	90	29	205	—	8

a/ Mean for dates of collection.
b/ Iron in solution at time of analysis.

Table 11 - CONEWANGO CREEK BASIN

CONEWANGO CREEK AT RUSSELL, PA.

Temperature (°F.) of water, water year October 1951 to September 1952

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	56	47	36	34	34	36	43	55	61	74	77	72
2	62	46	38	34	34	34	44	56	61	74	72	73
3	62	44	38	33	35	35	45	56	63	76	72	69
4	63	41	39	33	36	36	44	55	65	75	74	68
5	63	40	41	33	35	35	45	57	64	74	74	68
6	61	40	41	33	35	33	43	57	65	74	72	68
7	50	40	43	32	33	33	42	55	65	70	73	67
8	51	38	45	33	35	33	40	55	65	77	73	66
9	58	39	44	33	33	32	40	56	68	76	73	66
10	58	38	41	33	33	33	42	58	66	72	74	66
11	58	39	36	33	33	36	44	59	60	72	72	67
12	54	38	35	33	33	34	45	55	64	73	73	68
13	53	41	34	33	32	36	46	50	63	75	71	68
14	52	44	34	35	33	33	45	48	66	77	70	68
15	54	45	32	40	33	33	45	50	68	78	72	70
16	55	45	32	37	35	33	43	53	68	77	73	66
17	56	42	32	36	34	34	44	54	70	75	73	64
18	56	42	32	37	34	33	46	54	70	78	71	66
19	53	36	33	34	34	36	49	55	70	78	73	65
20	52	34	33	35	33	36	54	55	70	77	74	63
21	53	33	33	33	33	39	55	55	69	79	71	62
22	56	34	32	33	34	42	57	53	69	80	70	58
23	58	39	32	32	35	40	58	54	70	79	72	58
24	56	39	32	32	33	40	55	58	71	78	73	56
25	55	36	32	32	33	40	55	58	74	80	73	56
26	54	36	32	33	34	42	54	58	75	76	68	57
27	53	34	32	34	34	40	53	59	76	79	68	57
28	--	33	32	33	35	40	54	60	76	76	70	57
29	52	33	32	32	35	38	56	61	75	76	72	58
30	51	35	33	32	--	38	55	59	75	75	70	60
31	50	--	33	32	--	40	--	60	--	75	72	--
Average	56	39	35	34	34	36	48	56	68	76	72	64

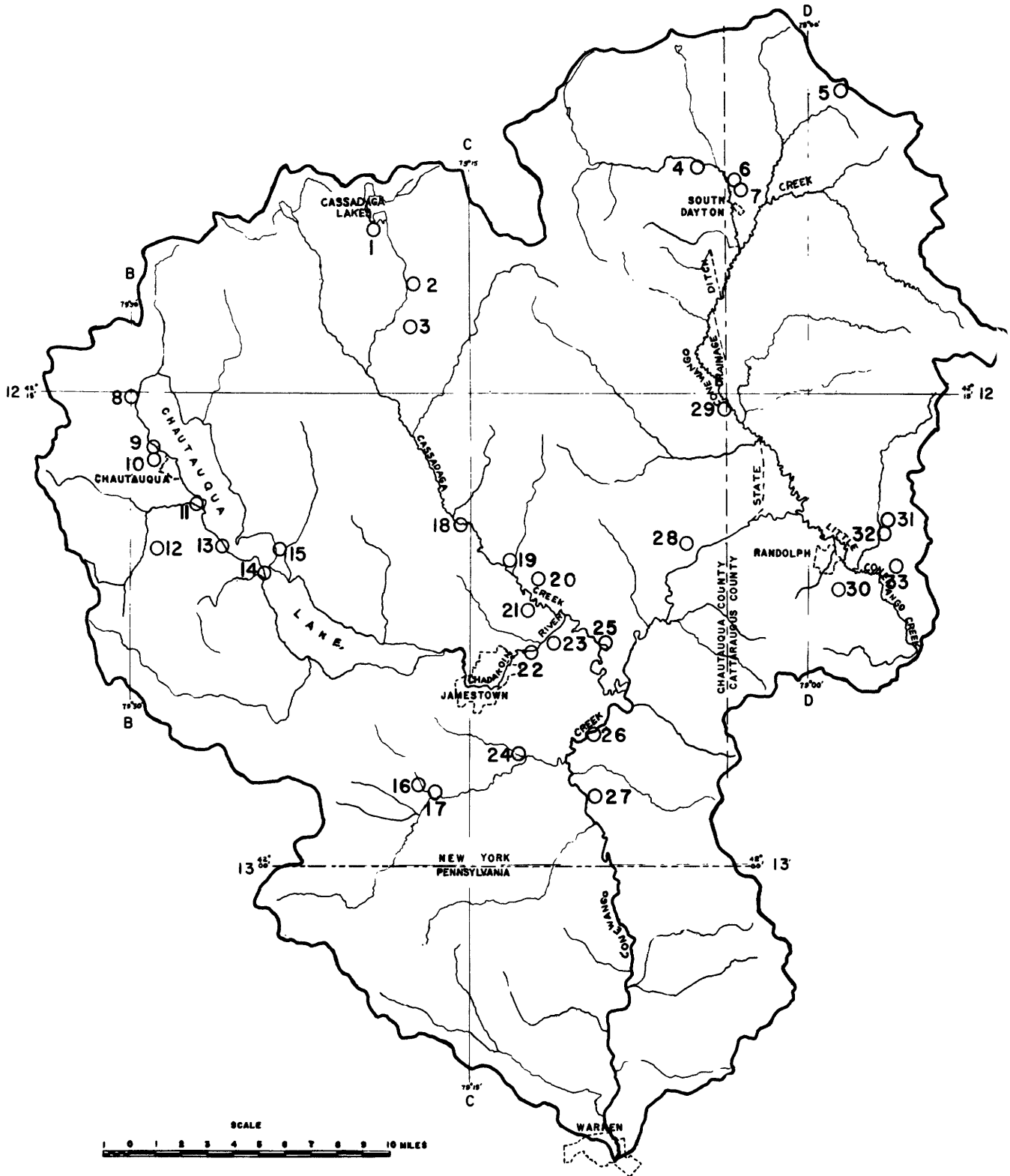


FIGURE 7. MAP OF CONEWANGO CREEK DRAINAGE BASIN SHOWING GROUND WATER SAMPLING SITES

Table 12. - RECORDS OF SAMPLED WELLS

Well site number	Location a/	Owner	Altitude above sea level (feet) b/
1	11B, 11.4S, 9.3E	Village of Cassadaga	1314
2	11B, 13.7S 10.8E	Ben Nichols	1340
3	11B, 14.9S, 10.6E	Ben Nichols	1330
4	11C, 9.0S, 8.6E	George Nobles	1320
5	11D, 5.9S, 1.0E	Charles Albright	1350
6	11C, 9.5S, 10.0E	Village of South Dayton	1310
7a	11C, 9.9S, 10.4E	Mohawk Milk Company	1300
7b	11C, 9.9S, 10.4E	Mohawk Milk Company	1300
7c	11C, 9.9S, 10.4E	Mohawk Milk Company	1300
8	12B, 0.2S, 0.0E	Village of Mayville	1330
9	12B, 2.0S, 0.9E	Peter Graeske	1340
10	12B, 2.2S, 0.8E	G. A. Martz	1328
11	12B, 4.1S, 2.8E	A. E. Jones	1315
12	12B, 5.6S, 1.2E	Stedman Grange	1560
13	12B, 5.7S, 3.6E	Woodlawn Water Co.	1320
14	12B, 6.7S, 5.1E	Dean Meddock	1310
15	12B, 5.8S, 5.7E	Donald Smith	1330
16	12B, 14.9S, 11.2E	A. T. Lane	1375
17	12B, 14.9S, 11.5E	George Griffin	1340
18a	12B, 4.8S, 12.8E	Ma & Pa's Restaurant	1260
18b	12B, 4.8S, 12.8E	Ma & Pa's Restaurant	1260
19	12C, 6.3S, 1.4E	Fred Wetsel	1260

a/ Location of well site on map by grid coordinates, mileage and direction. First number and letter are grid coordinates. Numbered grid lines run north-south and lettered grid lines run west-east. Second and third sets of numbers and letters give miles and direction See Figure 8 on page 50.

IN CONEWANGO CREEK BASIN

Depth (feet)	Water-bearing formation	Yield (gallons) per minute)	Use c/	Temperature (°F)	Date temperature taken
18	Pleistocene gravel	—	PWS	—	—
110	Chemung formation	25+	Farm	—	—
100	Chemung formation	20+	Farm	52	Aug. 20, 1952
22	Pleistocene gravel	—	Dom	58	Aug. 19, 1952
70	Pleistocene gravel	50+	Dom	50	Aug. 19, 1952
210	Pleistocene gravel	200	PWS	54	Aug. 19, 1952
25	Pleistocene gravel	50+	Ind	51	Aug. 19, 1952
411	Pleistocene gravel	150+	Ind	55	Aug. 19, 1952
514	Pleistocene gravel	75	Ind	57	Aug. 19, 1952
32	Pleistocene gravel	300	PWS	57	Aug. 21, 1952
120	Chemung formation	2	Dom	—	—
125	Chemung formation	25	Dom	54	Aug. 21, 1952
107	Pleistocene sand and gravel	50	PWS	49	Aug. 21, 1952
60	Chemung formation	6	Dom	49	Aug. 21, 1952
19	Pleistocene gravel	25+	PWS	—	—
203	Pleistocene gravel	60+	Dom	—	—
400	Pleistocene sand and gravel	300	Dom	—	—
80	Chemung formation	2+	Dom	—	—
—	Unknown	—	Dom	—	—
135	Pleistocene gravel	50+	Dom	—	—
240	Pleistocene gravel	75	none	56	Aug. 20, 1952
125	Pleistocene gravel	200	Dom	52	Aug. 20, 1952

b/ Approximate altitude of land surface at well as scaled from topographic map.

c/ Dom - domestic; Ind. - industrial; PWS— public water supply.

Table 12. - RECORDS OF SAMPLED WELLS

Well site number	Location a/	Owner	Altitude above sea level (feet) b/
20	12C, 7.0S, 2.8E	Leonard Becker	1300
21	12C, 8.0S, 2.5E	City of Jamestown	1250
22a	12C, 9.7S, 2.3E	Jamestown Mallable Iron Co.	1280
22b	12C, 9.7S, 2.3E	Jamestown Mallable Iron Co.	1280
23a	12C, 9.5S, 2.8E	National Worsted Knitting Mills, Inc.	1250
23b	12C, 9.5S, 2.8E	National Worsted Knitting Mills, Inc.	1250
24	12C, 13.4S, 1.8E	J. E. Jacobson	1275
25	12C, 9.3S, 5.1E	John Ceresa	1260
26a	12C, 12.7S, 4.7E	Village of Frewsburg	1252
26b	12C, 12.7S, 4.7E	Village of Frewsburg	1252
27	12C, 14.9S, 4.9E	Max Hasted	1320
28	12C, 5.7S, 8.2E	C. C. Anderson	1300
29	12C, 0.6S, 9.7E	Raymond Ray	1300
30	12D, 7.4S, 1.0E	Village of Randolph	1570
31	12D, 4.4S, 2.8E	Berton Adams	1420
32	12D, 4.8S, 2.8E	Frank Wright	1430
33	12D, 6.5S, 3.3E	Village of East Randolph	1340

IN CONEWANGO CREEK BASIN (Continued)

Depth (feet)	Water-bearing formation	Yield (gallons per minute)	Use c/	Temperature (°F)	Date temperature taken
55	Chemung formation	50	Dom	—	—
125	Pleistocene gravel	700	PWS	48	Feb. 5, 1952
45	Pleistocene gravel	500	Ind	—	—
34	Pleistocene gravel	350	Ind	—	—
45	Pleistocene gravel	450	Ind	50	Aug. 21, 1952
45	Pleistocene gravel	450	Ind	49	Aug. 21, 1952
65	Pleistocene gravel	50+	Farm	50	Aug. 20, 1952
100	Pleistocene sand and gravel	50	Dom	50	Aug. 21, 1952
43	Pleistocene sand and gravel	150	PWS	50	Aug. 21, 1952
44	Pleistocene sand and gravel	150	PWS	50	Aug. 21, 1952
61	Chemung formation	15	Dom	—	—
60	Pleistocene sand and gravel	10	Farm	53	Aug. 21, 1952
41	Pleistocene sand and gravel	50	Dom	—	—
27	Pleistocene gravel	—	PWS	—	—
218	Chemung formation	25	Farm	54	Aug. 21, 1952
—	Chemung formation	—	Farm	55	Aug. 21, 1952
60	Pleistocene sand and gravel	—	PWS	—	—

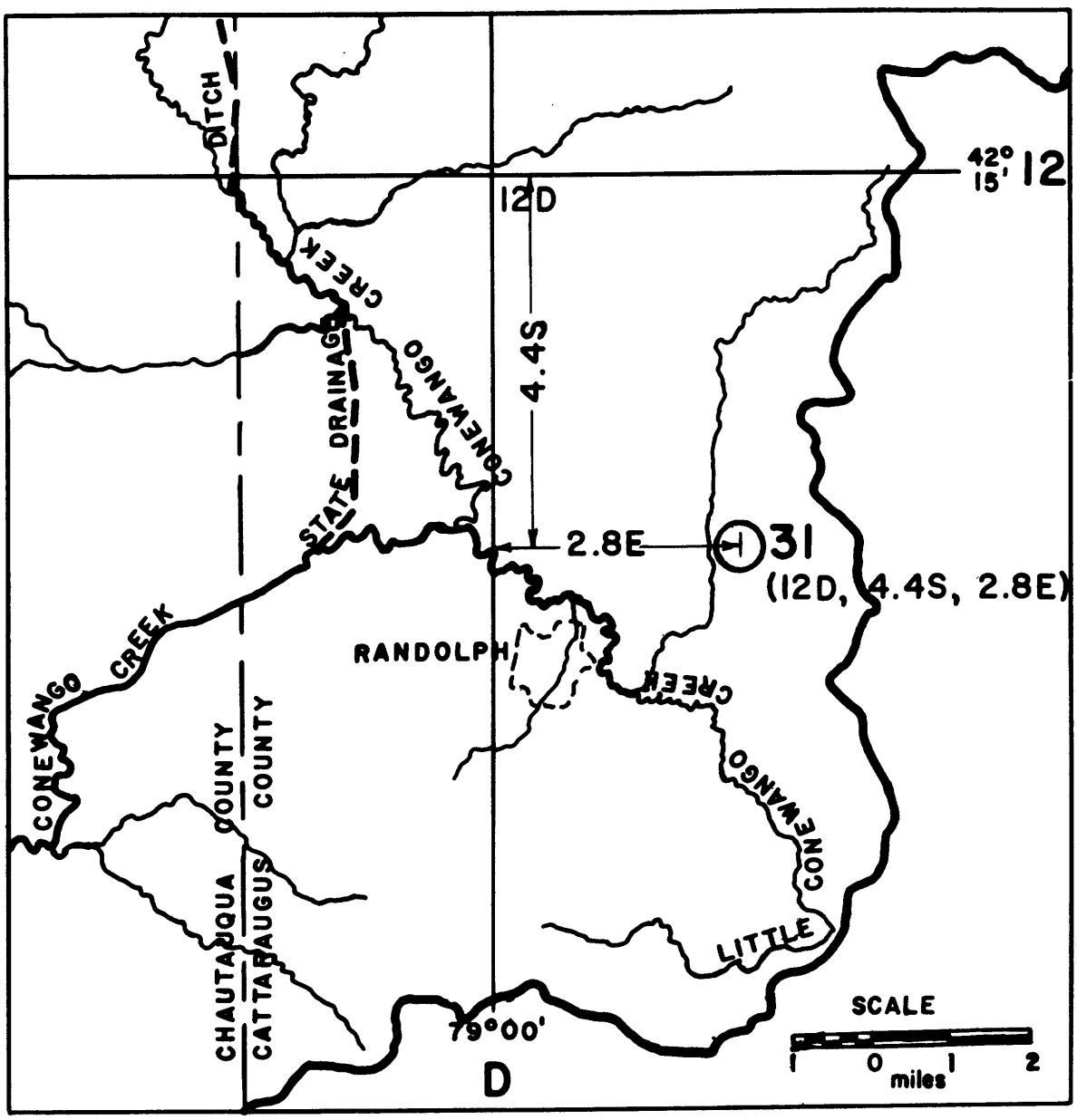


Figure 8.– SKETCH MAP ILLUSTRATING WELL LOCATION SYSTEM.

Table 13. - CONEWANGO CREEK BASIN

MISCELLANEOUS GROUND WATER ANALYSES

Analyses by Geological Survey, United States Department of the Interior
(parts per million)

36631

Location Number (See Figure 7)	1	2	3	4	5	6
Date of collection.....1952.	Aug.20	Aug.20	Aug.20	Aug.19	Aug.19	Aug.19
Silica (SiO_2)	8.9	8.9	11	29	13	8.7
Iron (Fe), dissolved 1/	.01	.02	.01	.03	.06	.03
Iron (Fe), total	.04	.17	.04	1.7	.95	.06
Manganese (Mn), dissolved 1/	.01	.02	.04	.02	.00	.00
Manganese (Mn), total	—	—	—	.04	—	—
Calcium (Ca)	38	22	34	38	85	12
Magnesium (Mg)	6.5	3.9	5.2	10	16	1.5
Sodium (Na)	2.2	6.3	24	2.1	4.6	154
Potassium (K)	1.0	.9	1.7	.5	.9	2.3
Lithium (Li)	—	—	.6	—	.4	1.8
Bicarbonate (HCO_3)	131	84	146	130	222	260
Carbonate (CO_3)	0	0	0	0	0	8
Sulfate (SO_4)	18	17	20	30	100	6.6
Chloride (Cl)	3.5	5.0	17	1.8	6.1	110
Fluoride (F)	.2	.2	.5	.0	.1	.9
Nitrate (NO_3)	.8	.9	.5	2.3	1.0	1.5
Dissolved solids						
Sum						
Residue on evaporation at 180°C	153	103	180	176	342	435
Hardness as $CaCO_3$	122	71	106	136	278	36
Non-carbonate	14	2	0	29	96	0
Specific conductance (micromhos at 25°C)	245	175	305	268	526	764
pH	7.9	7.4	7.5	7.6	8.0	8.4
Color	5	5	7	5	2	1

1/In solution at time of analysis.

1. Owner: Village of Cassadaga, Chautauqua Co., N.Y
Sample is mixture of water from two public supply wells of the Village of Cassadaga.

2. Owner: Mr. Ben Nichols near Meons, Chautauqua Co., N.Y.

3. Owner: Mr. Ben Nichols at Meons, Chautauqua Co., N.Y.

4. Owner: Mr. George Nobles at Balcom, Chautauqua Co., N.Y.

5. Owner: Mr. Charles Albright at Dayton, Cattaraugus Co., N.Y.

6. Owner: Village of South Dayton, Cattaraugus Co., N.Y.
Well used for public supply. Supt. - Mr. Alvin Keppel

Table 13. - CONEWANGO CREEK BASIN (Continued)
MISCELLANEOUS GROUND WATER ANALYSES (Continued)

Analyses by Geological Survey, United States Department of the Interior
(parts per million)

36631

Location Number (See Figure 7)	7a	7b	7c	8	9	10
Date of collection.....1952.	Aug.19	Aug.19	Aug.19	Aug.21	Aug.21	Aug.21
Silica (SiO_2).....	9.2	14	14	28	25	11
Iron (Fe), dissolved 1/.....	.09	.04	.04	.01	.03	.00
Iron (Fe), total.....	1.9	.21	.28	.14	.76	.82
Manganese (Mn), dissolved 1/ ...	.00	.00	.00	.00	.44	.03
Manganese (Mn), total	—	—	—	.02	.52	—
Calcium (Ca).....	92	24	22	39	28	32
Magnesium (Mg).....	12	3.3	3.9	13	6.1	6.1
Sodium (Na).....	8.7	30	49	4.9	1.2	14
Potassium (K).....	1.6	.6	1.3	.6	.6	.7
Lithium (Li).....	.5	—	—	—	—	—
Bicarbonate (HCO_3)	199	157	180	150	90	154
Carbonate (CO_3)	0	0	0	0	0	0
Sulfate (SO_4).....	116	3.8	5.4	22	19	7.0
Chloride (Cl).....	9.8	5.0	19	8.3	.7	1.5
Fluoride (F).....	.1	.6	.7	.0	.3	.5
Nitrate (NO_3).....	1.1	.7	.3	5.0	2.3	.8
Dissolved solids						
Sum.....						
Residue on evaporation at 180°C.....	374	145	212	187	125	150
Hardness as $CaCO_3$	279	73	71	151	95	105
Non-carbonate	116	0	0	28	21	0
Specific conductance (micromhos at 25°C).....	568	260	335	350	175	253
pH.....	7.3	7.4	7.2	7.7	7.5	7.7
Color.....	2	8	12	5	10	1

1/In solution at time of analysis.

7 (a,b.c,) Owner: Mohawk Milk Company at South Dayton, Cattaraugus Co., N.Y.

8. Owner: Village of Mayville, Chautauqua Co., N.Y.
Well one of several used for public supply purposes. Supt.-Mr. James Dudley

9. Owner: Mr. Peter Graeske near Chautauqua, Chautauqua Co., N.Y.

10. Owner: Mr. G. A. Martz near Chautauqua, Chautauqua Co., N.Y.

Table 13. - CONEWANGO CREEK BASIN (Continued)

MISCELLANEOUS GROUND WATER ANALYSES (Continued)

Analyses by Geological Survey, United States Department of the Interior
(parts per million)

36631

Location Number (See Figure 7)	11	12	13	14	15	16
Date of collection.....1952.	Aug.21	Aug.21	Aug.21	Aug.21	Aug.21	Aug.20
Silica (SiO_2)	26	16	6.8	10	12	7.2
Iron (Fe), dissolved 1/	.01	.04	.09	.12	.03	.03
Iron (Fe), total	.33	1.5	1.2	.16	.05	1.5
Manganese (Mn), dissolved 1/	.01	.02	.00	.01	.03	.11
Manganese (Mn), total	.05	—	.18	.01	—	.27
Calcium (Ca)	35	61	59	25	26	24
Magnesium (Mg)	8.2	13	7.0	4.7	4.0	6.7
Sodium (Na)	4.8	5.5	6.7	30	6.9	80
Potassium (K)	.7	1.0			.7	2.7
Bicarbonate (HCO_3)	141	238	185	173	117	253
Carbonate (CO_3)	0	0	0	0	0	0
Sulfate (SO_4)	14	25	34	1.5	2.7	25
Chloride (Cl)	2.9	3.5	2.6	3.1	2.0	25
Fluoride (F)	.0	.1	.0	.1	.1	.2
Nitrate (NO_3)	.3	.2	.3	.3	.2	.4
Dissolved solids						
Sum						
Residue on evaporation at 180°C	153	242	220	153	112	295
Hardness as $CaCO_3$	121	206	176	82	81	88
Non-carbonate	6	11	24	0	0	0
Specific conductance (micromhos at 25°C)	249	385	352	256	188	501
pH	7.7	8.0	7.5	7.5	7.8	7.7
Color	10	7	10	5	0	8

1/In solution at time of analysis.

11. Owner: Mr. A. W. Jones at Pendergast Point, Chautauqua Co., N.Y.

12. Owner: Stedman Grange at Stedman, Chautauqua Co., N.Y.

13. Owner: Woodlawn Water Works, Woodlawn, Chautauqua Co., N.Y.

14. Owner: Mr. Dean Meddock at Stowe, Chautauqua Co., N.Y.

15. Owner: Mr. Donald Smith at Bemus Point, Chautauqua Co., N.Y.

16: Mr. A. T. Lane at Busti, Chautauqua Co., N.Y.

Table 13. - CONEWANGO CREEK BASIN (Continued)

MISCELLANEOUS GROUND WATER ANALYSES (Continued)

Analyses by Geological Survey, United States Department of the Interior
(parts per million)

36631

Location Number (See Figure 7)	17	18a	18b	19	20	21
Date of collection 1952	Aug.20	Aug.20	Aug.20	Aug.20	Aug.20	Feb. 5
Silica (SiO_2)	5.6	10	38	8.7	39	6.1
Iron (Fe), dissolved 1/	.01	.06	.00	.10	.03	.01
Iron (Fe), total	.20	.38	.10	.11	2.8	.13
Manganese (Mn), dissolved 1/	.02	.11	.02	.00	.27	.01
Manganese (Mn), total	.10	.11	.04	.00	.33	---
Calcium (Ca)	51	26	21	22	22	32
Magnesium (Mg)	6.2	3.2	5.8	7.3	5.1	5.6
Sodium (Na)	6.5	16	12	20	9.9	3.9
Potassium (K)	8.4		1.0	.6	1.6	.7
Bicarbonate (HCO_3)	182	130	120	72	100	100
Carbonate (CO_3)	0	0	0	0	0	0
Sulfate (SO_4)	26	2.0	2.8	57	11	24
Chloride (Cl)	6.9	3.0	3.6	7.0	3.3	2.6
Fluoride (F)	.0	.0	.4	.2	.5	.1
Nitrate (NO_3)	1.0	.2	.3	.5	1.1	.3
Dissolved solids						
Sum						
Residue on evaporation at 180°C	205	118	137	163	158	127
Hardness as $CaCO_3$	153	78	76	85	76	103
Non-carbonate	4	0	0	26	0	21
Specific conductance (micromhos at 25°C)	352	202	193	230	186	214
pH	7.0	8.0	7.7	7.9	7.4	8.0
Color	5	5	5	7	12	1

1/In solution at time of analysis.

17. Owner: Mr. George Griffin at Busti, Chautauqua Co., N.Y.

18. (a,b)Owner: Ma and Pa's Restaurant near Gerry, Cahutauqua Co., N.Y.

19. Owner: Mr. Fred Wetzel at Ross Mills, Chautauqua County, N.Y.

20. Owner: Mr. Leonard Becker near Levant, Chautauqua Co., N.Y.

21. Owner: City of Jamestown, Chautauqua Co., N.Y. Samples taken from Well No. 4 of Jamestown's public Supply wells. Supt. Mr. Clayton O. Johnson.

Table 13. - CONEWANGO CREEK BASIN (Continued)

MISCELLANEOUS GROUND WATER ANALYSES (Continued)

Analyses by Geological Survey, United States Department of the Interior
(parts per million)

36631

Location Number (See Figure 7)	22a	22b	23a	23b	24	25
Date of collection 1952	Aug.20	Aug.20	Aug.21	Aug.21	Aug.20	Aug.21
Silica (SiO_2)	9.9	11	7.6	25	9.3	7.7
Iron (Fe), dissolved 1/	.07	.01	.08	.01	.08	.03
Iron (Fe), total	1.6	1.6	.27	.03	.10	.82
Manganese (Mn), dissolved 1/	—	.00	.00	.14	.02	.00
Manganese (Mn), total	—	—	.01	.24	.07	.00
Calcium (Ca)	59	56	50	41	36	26
Magnesium (Mg)	12	7.6	6.2	5.3	6.3	2.7
Sodium (Na)	14	29	7.0	11	11	13
Potassium (K)	2.4	2.0	1.1	1.9		
Bicarbonate (HCO_3)	191	216	133	127	151	117
Carbonate (CO_3)	0	0	0	0	0	0
Sulfate (SO_4)	51	27	47	22	8.5	1.5
Chloride (Cl)	15	22	6.0	16	5.0	4.2
Fluoride (F)	.0	.5	.1	.0	.2	.0
Nitrate (NO_3)	.5	1.1	2.5	1.8	.2	.3
Dissolved solids						
Sum						
Residue on evaporation at 180°C	264	256	198	190	147	107
Hardness as $CaCO_3$	197	171	150	124	116	76
Non-carbonate	40	0	41	20	0	0
Specific conductance (micromhos at 25°C)	437	427	318	321	254	190
pH	7.4	7.5	7.6	7.4	7.7	7.9
Color	2	7	2	5	5	10

1/In solution at time of analysis.

aa. (a,b) Owner: Jamestown Mallable Iron Company at Jamestown, Chautauqua Co., N.Y.

23. (a,b) Owner: National Worsted Knitting Mills, Inc., at Falconer, Chautauqua Co., N.Y.

24. Owner: Mr. J. E. Jacobson at Stillwater, Chautauqua Co., N.Y.

25. Owner: Mr. John Ceresa near Falconer, Chautauqua Co., N.Y.

Table 13. - CONEWANGO CREEK BASIN (Continued)

MISCELLANEOUS GROUND WATER ANALYSES (Continued)

Analyses by Geological Survey, United States Department of the Interior
(parts per million)

36631

Location Number (See Figure 7)	26a	26b	27	28	29	30
Date of collection.....1952	Aug.21	Aug.21	Aug.21	Aug.21	Aug.19	Aug.21
Silica (SiO_2)	35	9.2	8.6	25	11	9.4
Iron (Fe), dissolved 1/	.01	.03	.04	.01	.00	.01
Iron (Fe), total	.09	.05	.25	.04	.09	.05
Manganese (Mn), dissolved 1/	.00	—	.06	.04	.01	.00
Manganese (Mn), total	.04	—	.07	.09	—	—
Calcium (Ca)	64	61	44	45	40	34
Magnesium (Mg)	9.6	12	6.8	12	6.5	5.6
Sodium (Na)	6.0	6.4	14	2.2	61	4.2
Potassium (K)	1.4	1.7		2.0	1.6	.6
Lithium (Li)	—	—	—	—	1.2	—
Bicarbonate (HCO_3)	199	206	172	173	199	117
Carbonate (CO_3)	0	0	0	0	0	0
Sulfate (SO_4)	34	23	22	16	12	23
Chloride (Cl)	5.7	7.2	2.6	4.0	66	.5
Fluoride (F)	.0	.1	.0	.0	.2	.2
Nitrate (NO_3)	9.5	20	.0	5.2	.2	.6
Dissolved solids						
Sum						
Residue on evaporation at 180°C	259	249	178	193	311	140
Hardness as $CaCO_3$	199	202	138	162	126	108
Non-carbonate	36	33	0	20	0	12
Specific conductance (micromhos at 25°C)	399	416	307	355	523	223
pH	7.7	7.6	7.7	7.7	7.5	7.6
Color	5	2	5	5	0	2

1/In solution at time of analysis.

26.(a,b) Owner: Frewsburg Water District, Frewsburg, Chautauqua Co., N.Y. Samples are of the two wells used by Frewsburg for public supply.

27. Owner: Mr. Max Hasted near Frewsburg, Chautauqua Co., N.Y.

28. Owner: Mr. C. C. Anderson near Kennedy, Chautauqua Co., N.Y.

29. Owner: Mr. Raymond Ray at Clear Creek, Chautauqua Co., N.Y.

30 Owner: Village of Randolph, Cattaraugus Co., N.Y.

Table 13. - CONEWANGO CREEK BASIN (Continued)

MISCELLANEOUS GROUND WATER ANALYSES (Continued)

Analyses by Geological Survey, United States Department of the Interior
(parts per million)

36631

Location Number (See Figure 7)	31	32	33			
Date of collection.....1952.	Aug.21	Aug.21	Aug.21			
Silica (SiO_2)	9.1	12	9.5			
Iron (Fe), dissolved 1/	.07	—	.03			
Iron (Fe), total	1.0	.17	.09			
Manganese (Mn), dissolved 1/	.00	.04	.00			
Manganese (Mn), total	.00	—	—			
Calcium (Ca)	17	14	34			
Magnesium (Mg)	2.3	3.9	4.3			
Sodium (Na)	80	82	3.0			
Potassium (K)	2.0	1.9	.5			
Bicarbonate (HCO_3)	204	200	112			
Carbonate (CO_3)	0	0	0			
Sulfate (SO_4)	6.0	4.0	16			
Chloride (Cl)	41	48	2.0			
Fluoride (F)	.3	—	.1			
Nitrate (NO_3)	.2	.2	1.4			
Dissolved solids						
Sum						
Residue on evaporation at 180°C	254	274	130			
Hardness as $CaCO_3$	52	51	103			
Non-carbonate	0	0	11			
Specific conductance (micromhos at 25°C)	440	454	208			
pH	7.7	7.9	8.0			
Color	5	5	3			

1/In solution at time of analysis.

31. Owner: Berton Adams near East Randolph, Cattaraugus Co., N.Y.

32. Owner: Frank Wright near East Randolph, Cattaraugus Co., N.Y.

33. Owner: Village of East Randolph, Cattaraugus Co., N.Y.

APPENDIX

Definition of Terms

Carbonate hardness - That portion of the total hardness which combines with the carbonate and bicarbonate ions in water.

Color - A visual effect due only to substances in solution.

Equivalent per million (epm) - The concentration of an element or radical in parts per million divided by its chemical combining weight.

Parts per million (ppm) - A unit weight of a constituent in a million unit weights of solution: a milligram of substance per liter of water weighing 1 kilogram.

pH - The negative logarithm of the hydrogen ion concentration. Neutral water has a pH value of 7, acid water of less than 7 and alkaline water of greater than 7.

Specific conductance - A measured ability of a water to conduct an electric current expressed in micromhos (reciprocal ohms x 10^6). An approximate measure of the dissolved solids can be obtained from it since a high specific conductance generally indicates a larger concentration of dissolved solids than does a lower value.

Factors

1. Carbonate hardness = total hardness - non-carbonate hardness.
2. Parts per million x 0.0584 = grains per gallon.
3. ppm HCO_3 x 0.8202 = ppm alkalinity as $CaCO_3$.